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LEAGUE OF NATIONS.

Health Organisation.

COLLABORATION WITH THE MINISTRY OF HEALTH OF THE NATIONAL GOVERNMENT OF THE REPUBLIC OF CHINA

COMPLETION OF THE SURVEY OF CHINESE PORTS

AND

REPORT ON THE REORGANISATION OF THE PORT HEALTH SERVICES,

IN CONFORMITY WITH THE REQUEST
OF THE NATIONAL GOVERNMENT OF CHINA

Price: 2/6 $0.60

GENEVA, 1930

LEAGUE OF NATIONS

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In September 1929, the Chinese National Government informed the Council by telegram that it "would welcome a Commission of experts from the Health Organisation of the League of Nations to come to China as soon as possible to make a survey on port health and maritime quarantine".

Acting upon the Council's decision, two representatives of the Health Organisation proceeded to China to discuss with the competent authorities a detailed plan for submission to the Health Committee.

As a result of the discussions which took place, the Chinese National Government presented certain proposals for collaboration with the League of Nations on health matters, which are set forth in the above document, together with the decisions taken in this connection by the Health Committee in March 1930.

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Collaboration with the Ministry of Health of the National Government of the Republic of China.

COMPLETION OF THE SURVEY OF CHINESE PORTS AND REPORT ON THE REORGANISATION OF THE PORT HEALTH SERVICES.

In Conformity with the Request of the National Government of China.

I. INTRODUCTION.

Following the approval of the report by the Medical Director on his mission to China, the Health Committee, at its session in March 1930, agreed that the survey of the ports which had been commenced should be completed, and that proposals for the reorganisation of the quarantine service in Chinese ports should be submitted for consideration by the Commission for Quarantine Measures in China, which had been set up by the Health Committee.

As a result, a supplementary survey has been carried out, and subsequently a study has been made, with the study tour group of port health officers, of quarantine administration and procedure in the following ports outside China — namely, Batavia, Singapore, Saigon, Hong-Kong, Manila, Kobe and Yokohama. The ports of Dairen, Moji and Nagasaki were also visited and their quarantine practice studied *en route* to China.

The information obtained by this study has been taken into consideration in preparing the report, owing to the similarity between certain of the problems in the various countries visited and those of the Chinese Republic.

II. SHORT HISTORY OF QUARANTINE IN CHINA.

Exact details of the establishment of quarantine services in Chinese ports in their chronological order are difficult to obtain. So far as Shanghai is concerned, "sanitary" regulations for the port were first issued in 1873, under the authority of the Superintendent of Customs and the Treaty Power Consuls. These regulations required infected and suspected ships to anchor one mile below harbour limits, where they were inspected by the Health Officer of the Shanghai Municipal Council.

During the plague epidemic of 1894, the first "sanitary station" was established, consisting of a number of junks for the housing of staff and contacts of infected cases.

Since 1899, some form of shore station has been provided.

It would appear that, from time to time since the outbreak of plague in 1894, an organisation has been set up in different ports designed primarily to prevent the introduction of that disease, but also providing for measures to be taken against other diseases.

III. GENERAL REVIEW OF PRESENT SERVICES.

A. (*i*) ADMINISTRATION.

In general, the Commissioner of Customs in each port, as the representative of the Inspector-General of the Chinese Maritime Customs, is responsible for the local administration of the quarantine service.

The Ministerial head is the Minister of Finance, under whom the Chinese Maritime Customs is administered. There are exceptions to this general statement. For example, in Canton, Tsingtao and Swatow, the quarantine service is under the control of the municipality; but, whereas in Canton the Commissioner of Public Health is the responsible head, in Tsingtao the control is vested in the harbour-master, and in Swatow, in the mayor.

This may be said to be the trend of events — namely, the removal of the control of the service of individual ports at appropriate times from the Customs department, where there is a blending of foreign and national control, to a department under national control.

(*ii*) POWERS.

The powers of the quarantine service are contained in regulations made public by the Commissioner of Customs, by order of the Inspector-General and with the agreement and sanction of the Superintendent of Customs, as the representative of the Chinese Government, and the Treaty Power Consuls at the port, representing their respective Governments.

Should the Government of a foreign country not approve the regulations, they may not be enforced against vessels flying the flag of that country.

Regulations.

The regulations in most ports are drafted along similar lines, and give to the Superintendent of Customs and the Board of Treaty Power Consuls authority:

(*a*) To declare ports infected;

(*b*) To withdraw such declaration;

(*c*) To authorise such other precautions as may be expedient for the purpose of preventing either the importation or (in the event of an epidemic of disease at the port) the exportation of disease.

The diseases, the existence of which in epidemic form in a port render it liable to be declared infected, are: plague, cholera, typhus, yellow fever, smallpox, scarlet fever.

A disease is considered to be present in epidemic form when, following the first report of its occurrence, weekly reports show an average of twenty-one new cases.

Generally, vessels coming from infected ports only are medically inspected on arrival and are classified as infected or suspected.

Infected Vessel.

An infected vessel is one which at the time of arrival or in the ten days prior to arrival had on board a case of cholera, typhus fever, yellow fever, plague, smallpox, scarlet fever or other infectious disease, or a person suspected of infection by any of these diseases, or the body of a person who might be suspected to have been so infected.

Suspected Vessel.

A suspected vessel is one which arrived within ten days of her departure from an infected port and/or a vessel on board which a death occurred during the voyage from her last port.

Treatment of Vessels.

(*a*) Infected vessels are submitted to measures considered necessary by the port health officer, who is empowered to detain the vessel in quarantine for a period not exceeding ten days from the date of removal of the last infected case.

(*b*) Suspected vessels are admitted to pratique if medical inspection fails to disclose the presence of infection, with the exception of vessels from ports declared infected with pneumonic plague, which are not entitled to receive pratique until seven clear days have elapsed since leaving the infected port.

Fumigation.

(*a*) All vessels entering the ports are subject to fumigation unless they produce a certificate showing that this operation has been carried out within the previous six months.

(*b*) In addition, vessels from plague-infected ports are subject to fumigation before unloading unless they produce a certificate signed by the port health authority of the infected or an intermediate port, certifying that the vessel was fumigated after cargo had been loaded and the hatches closed.

This section caused considerable discussion, spread over a prolonged period, and in the later regulations was modified to the extent of permitting mail steamers to tie up in the port and discharge cargo, without fumigation, into registered lighters which had been previously fumigated and which are allowed to proceed to allotted berths only and not permitted to unload until fumigation had been performed with the cargo *in situ*. Theoretically, this is satisfactory, but in practice extremely difficult to apply efficiently in Chinese ports.

The harbour-master has definite responsibilities under the regulations.

For instance, (*a*) it is he who is empowered to allot the berths for the lighters used in the unloading of a mail steamer from a plague-infected port. (*b*) He is the authority who approves the pattern of ratguards to be fitted. (*c*) In general, also, it is he who is immediately responsible for the administrative work of the quarantine service of the port.

Exceptions.

Certain differences appear in the regulations — *e.g.*:

Tsingtao. — The regulations provide that:

(*a*) Every ship entering the port of Tsingtao is subject to quarantine inspection; and, further,

(*b*) Any ship arriving within ten days of her departure from a port where "contagious diseases" are prevalent, regardless of whether other ports have been called at, is regarded as an "infected ship".

Canton. — Every ship entering the port of Canton is subject to medical inspection. In practice, however, this is interpreted not to include river ships from Hong-Kong, Macao, Wuchow.

Wei-hai-wei. — By contrast, attention is drawn to a very interesting set of quarantine regulations — namely, those for the port of Wei-hai-wei (leased to Great Britain) which were made in February 1929 by the British Commissioner. These follow the International Sanitary Convention 1926 in regard to the classification of ships and the measures to be taken in regard to each class in respect of plague, cholera, yellow fever, typhus and smallpox. In addition, there is a general power vested in the health officer where a ship is a Chinese passenger-ship or has on board passengers who are in a filthy or otherwise unwholesome condition, or is overcrowded with passengers and it is desirable to check the introduction of any infectious or contagious disease, to order the ship to proceed to the quarantine anchorage, where the passengers and crew may be detained under observation or surveillance for a period not exceeding ten days from the arrival of the ship.

Costs of Quarantine.

Any costs and expenses charged or incurred by the Governments in the application of these regulations are to be paid by the owners or agents of the ship.

B. TECHNICAL ORGANISATION AND EQUIPMENT OF PORTS.

Speaking generally, it may be said that the technical organisation comprises a medical officer appointed by the Commissioner, with the approval of the Superintendent and Treaty Power Consuls, whose duty it is to inspect vessels in accordance with the regulations, and, in the case of infected vessels, to direct the measures to be taken in respect of:

(*a*) Infected or suspected persons;
(*b*) Bodies of persons who have died from the infection;
(*c*) The isolation of the vessel with her crew and passengers;
(*d*) The disinfection of the vessel.

The medical officer is in most ports a foreign medical man who is engaged also in private practice.

There are, however, exceptions to this. For example, at *Woosung* (the boarding-station for Shanghai and Yang-tze river ports) the port health officer is a foreign medical man, whose whole time is devoted to the quarantine service of the port. He is responsible also for the working of the foreign section of the "sanitary station" and for the admission and discharge (but not observation or treatment) of Chinese patients admitted to the Chinese section of the "sanitary station".

He has no duties outside the boarding-station, and is not concerned with the practice of routine fumigation in the port.

At *Canton*, the medical officers are all of Chinese nationality, but all serve on a part-time basis.

At *Taku*, the medical officers are attached to the Department of Public Health of Greater Tientsin, for which department they also carry out duties.

Equipment of the Ports.

This also varies considerably and at the best consists of:

(*a*) Suitable launches for conveying the medical officers to and from the vessels to be inspected;

(*b*) Some form of quarantine station for the hospitalisation of patients and the observation of contacts, with a disinfecting plant for treatment of infected goods;

(*c*) Fumigation apparatus.

But all of these essentials are, unfortunately, not provided at the larger ports. At Shanghai, for instance, there is provision for boarding vessels, but the sanitary station is so located that access is difficult by water and impracticable by land.

There are no facilities for treating patients and no plant that could be used for disinfection of goods on even a moderate scale. Laboratory facilities to aid in diagnosis or in controlling observation or surveillance are non-existent.

It is only when we come to the North that we find, at *Newchwang*, a quarantine station with hospital, laboratory, disinfection block and accommodation block for contacts, which, though difficult of access by water and inconveniently situated for isolation purposes, does provide the minimum equipment necessary to deal with a ship infected with quarantinable disease. This establishment is part of the organisation of the North Manchurian Plague Prevention Service.

At *Antung*, also, there is a quarantine station directly controlled by a board, over which the mayor presides and whose other members are the Superintendent of Customs and the Commissioner of Customs, who acts as secretary and treasurer. Here there is a small hospital of twelve beds, a laboratory, disinfection block and accommodation for thirty-five contacts.

Fumigation Equipment.

At *Shanghai*, there is a plant for the generation of carbon monoxide, a machine for generating sulphur dioxide and a supply of posts for sulphur fumigation. At other ports little fumigation is carried out, and, when it is done, it is by means of sulphur generated in pots. Consequently, the equipment in these ports consists of a few pots only.

So far as the larger ports are concerned, therefore, the present quarantine services do not do more than provide a medical service for the inspection of vessels, without any bacteriological facilities to aid in forming a correct diagnosis and without suitable facilities for handling an infected or suspected ship unless we are prepared to admit that efficient quarantine can in all cases be performed on board.

C. FINANCE. *

The financial responsibility for the existing services is borne by the Customs department or by the municipality, or by a combination of the two.

In *Shanghai*, the Customs department, the Shanghai municipal council and the French municipal council contribute to the upkeep of the service. In *Canton*, on the other hand, the whole cost of the service is borne by the municipality.

D. VALUE OF EXISTING SERVICES.

The value of the existing quarantine services is difficult to assess fairly.

In *Shanghai*, it is claimed that, in spite of the obvious incompleteness of the service provided, it does perform a useful function in the prevention of introduced disease.

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* For fuller details see Report by the Medical Director in document C.118.M.38.1930.III.

It can probably be claimed equally fairly in other ports that something of value is being done.

The criticism, however, that is warranted is that there is not, and never has been, any organised service for the country as a whole, nor any attempt to co-ordinate the individual efforts made in the various ports. The services have everywhere lacked technical direction and have depended for any success obtained entirely on the enthusiasm of the port health officers, whose efforts in many cases have not met with the support to which they were entitled from the administration.

One instance will suffice to illustrate this point. In one of the largest ports in China the port health officer complained that he had *never* been able to extract a reply to any of his communications to the Commissioner of Customs, although these contained requests for instructions on various matters of importance. Nor had he been able, by personal interview, to obtain any indication of the point of view held by that official, who was responsible for the administration of the regulations.

At present, then, there is a medley of administrative and financial control which precludes the possibility of the service forming a unit in the public health system of the country which is to be developed.

IV. POINTS FOR CONSIDERATION IN DETERMINING THE SERVICE REQUIRED.

Several matters require particular consideration. These include:

1. A recognition of the functions that a modern quarantine service might be expected to fulfil;

2. The geography and topography of the country and their influence on:
   (*a*) Foreign trade;
   (*b*) Internal trade;
   (*c*) The diseases likely to be introduced or exported, particularly from large emigrant ports;

3. The possibility of co-ordinating the quarantine service with existing shore health services;

4. Arrangements with neighbouring countries;

5. Finance.

1. Recognition of the Functions of a Modern Quarantine Service.

A modern quarantine service may be expected to be able to determine, with a considerable degree of accuracy, the risks associated with the arrival or departure of vessels, persons and goods from ports throughout the world. It is not, however, possible, without unduly hampering trade, to apply measures of protection which will entirely eliminate the risks of introduced or exported disease. This is because the incubation period of various diseases is sufficiently prolonged to permit passengers to arrive at their destination some days or even weeks after they have contracted a disease, without in the meantime showing signs or feeling symptoms which would indicate the existence of the infection. The development of a disease after arrival by persons in the incubation period is a possibility that must be realised and does not imply in itself the failure of the system, but rather indicates the importance of close co-operation between the quarantine and shore health services, to enable persons to be quickly traced and kept under surveillance in the event of such a development.

The success of a quarantine service depends on several factors outside its own competence. The first of these is the completeness of its information regarding the sanitary condition of ports from which vessels come. The second is the action taken in ports of departure and call to prevent disease being taken on board by crew, passengers, animals (including insects) or goods. Over this, the service has no control whatever, except by understanding or arrangement. The third is the care taken by the master and/or ship's surgeon to ascertain throughout the voyage the state of health of crew and passengers. Along with this is, of course, the ability of the master or the surgeon to recognise the earliest indications of disease as well as their endeavours to keep the sanitary state of the vessel at a high level.

Without the co-operation, then, of the port health authorities of other countries and the information that can be furnished on the arrival of the ship, the value of the quarantine officer's visit is much diminished. He can, of course, detect gross conditions of disease, but should not be expected to have supernatural powers.

A quarantine service may be compared with a fine sieve which prevents larger particles (gross disease conditions) from passing through, but which permits the passage of very fine particles (mild conditions of disease, persons in the incubation period).

From the point of view of preventing the exportation of disease, a quarantine service can similarly take steps to prevent the sailing of persons ill with infectious disease or of those who have been in close association with them. It may carry out prophylactic treatment or keep under surveillance persons for the incubation period of disease, although this is not a usual practice. In regard to animals and goods, it may take steps to prevent the loading of cargo unless satisfied it is free from rats or from contamination by organisms; but all such measures must be so regulated that the degree of interference with personal liberty and with trade is reduced to a minimum consistent with the objects aimed at.

2. GEOGRAPHY AND TOPOGRAPHY OF THE COUNTRY.

Chinese territory extends from latitude 53° N. to 18° N. and from longitude 74° E. to 134° E. The area is estimated at 4,278,352 square miles and the population at 485,508,838 persons.

The coastline, in the form of a semi-circle, is 2,150 miles in length from the mouth of the River Yalu to the boundary of Tongkin, but when all the indentations are reckoned it is approximately 5,000 miles in length. There are innumerable islands off the coast in the central and southern parts. Shoals fringe the northern coastline and navigation relies upon the channels made by the rivers — *e.g.*, the Liao (at Newchwang); the Pei Ho (at Taku for Tientsin), the Yang-tze-kiong (at Woosung for Shanghai).

A chain of volcanic islands separates the western portion of the Pacific Ocean from the deeper waters of the central and eastern Pacific. The seas of China are all within this barrier, and comprise the Yellow Sea, the Eastern China Sea, the South China Sea.

The better-known ports include Yingkou, Tientsin and Chinwangtao in Po-hai; Chefoo, Wei-hai-wei, Tsingtao and Shanghai facing the Yellow Sea; Hangchow, Ningpo, Wenchow, Foochow, Amoy, Swatow, all facing either the Eastern Sea or the Strait of Formosa, and Canton facing the China Sea.

(*a*) *Foreign Trade.*

There are altogether 74 open ports — 26 in Manchuria, 1 in Siukiang, 3 in Tibet and 44 in China proper. Of the ports in China proper, Shanghai is the main centre of distribution, while Tientsin, Hankow and Canton occupy a position as secondary centres respectively for North, Central and Southern China. The value of the whole trade of each port for 1926 and 1927[1] in Haikwan taels (the value of one tael is approximately three gold francs) was as follows:

Antung:		
Net foreign imports	39,269,885	37,170,475
Net Chinese imports	4,885,337	4,711,890
Exports	49,003,589	63,648,551

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[1] *China. Year-Book, 1930.*

Newchang:		
Net foreign imports	19,324,000	17,734,810
Net Chinese imports	32,296,443	24,859,306
Net exports	26,967,606	28,581,209
Tientsin:		
Net foreign imports	105,841,839	128,492,918
Net Chinese imports	76,103,282	76,849,196
Net exports	95,629,632	119,997,109
Hankow:		
Net foreign imports	66,646,665	34,228,671
Net Chinese imports	50,777,155	39,541,011
Net Exports	167,686,376	127,190,262
Nanking:		
Net foreign imports	15,245,701	4,723,231
Net Chinese imports	7,654,701	2,214,165
Net exports	22,063,222	5,119,439
Shanghai:		
Net foreign imports	389,416,904	294,107,879
Net Chinese imports	115,342,459	115,879,039
Net exports	469,527,912	458,991,566
Amoy:		
Net foreign imports	18,286,571	20,269,881
Net Chinese imports	13,875,792	15,708,194
Net exports	5,485,948	5,530,948
Swatow:		
Net foreign imports	27,206,571	31,656,092
Net Chinese imports	37,935,909	36,464,636
Net exports	20,930,244	19,665,918
Canton:		
Net foreign imports	79,687,153	43,656,900
Net Chinese imports	73,735,886	51,564,003
Net exports	108,182,665	77,261,509

Shanghai is also a centre for a considerable re-export trade to foreign countries, Hong-Kong, and to Chinese ports, chiefly those to the North and to the Yang-tze river ports.

Situated on the easternmost central point of the Chinese seaboard, *Shanghai* has undoubtedly a very favourable geographical position which is a large factor in her importance as a city and port. Shanghai has been stated to be literally at the world's cross-roads. Behind the city lies the wealth of the great Yang-tze basin, comprising an area of some 750,000 miles, or half of China proper, and natural highways by land and water reach her from the borders of Tibet and the regions of Central Asia. By sea, there is a direct run across the Pacific to Canada, the United States, Mexico and South America, and a southward run to Australia and New Zealand, while there is a south-eastward run to India, and so on to Persia, or by the Red Sea to Suez and Europe. Along all these routes are important ports, such as Kobé, Yokohama, Honolulu, Manila, Singapore, Colombo.

To the north there is the Trans-Siberian Railway, connecting Europe and the Far East. North China is so shaped that it is impossible for any one deep draft port to serve it. Shanghai is within easy reach of Dairen and Vladivostock, and is a concentration point for a great deal of the trade from the north. The produce of a vast section of Asia must necessarily pass through Shanghai on its way to the outside world and there it is sorted, repacked, prepared for the world's markets and shipped to its destination. In the same way a vast amount of the imports pour through Shanghai on their way to consumers throughout China proper, Mongolia and Tibet. Shanghai is thus a focal point, the centre of a network of oversea and inland trade routes.

The largest port in China north of Shanghai is *Tientsin*, which is situated at the junction of the Pei-ho river and the Grand Canal and governs all the southern traffic approaching Peking, from which it is distant about 86 miles by rail. There is a distance of about 37 miles between Tientsin and Taku, which is situated at the mouth of the Pei-ho river, and, owing to the shallowness of the river, larger vessels anchor at Taku. In winter, the river is frozen over for about two to three months — namely, from mid-December to the latter part of February or middle of March — and vessels call at Chinwangtao to the north of Tientsin, which is ice-free all the year round. This port is connected by rail with Tientsin, and steamers load directly on to railway-cars.

Tientsin is the gateway for the commerce, not only of the metropolitan province of Chih-li, but also of that of the larger part of Shansi and a part of several other northern provinces and of Manchuria. Formerly, Tientsin depended mainly upon river transportation for its commerce with interior places, but now a large part of the merchandise is carried by rail.

Another northern port of increasing importance is *Tsingtao*, which is well-equipped as a commercial port. Ocean-going steamers can be accommodated in the "Great Harbour", where there is at low-tide a depth of 30 feet alongside the piers. The trade of this port is of considerable importance owing to its location on the sea-routes between Tientsin and Shanghai and Dairen and Shanghai, on the one hand, and its railway connection with Tsinan, capital of Shantung, on the other hand. In 1928, the foreign trade of the port was valued at 63.6 million Haikwan taels, of which 39.3 million comprised imports and 26.3 million exports.

Other ports in the north of less commercial importance include *Newchwang*, *Antung* and *Chefoo*. Tho two former are icebound for several months in the winter, which hinders their development. Chefoo is one of the centres for the departure of emigrants from Shantung Province to Manchuria, many of whom pass through Newchwang.

In Southern China, the most important commercial city is *Canton*. It is, however, situated about eighty miles above the mouth of the Pearl River, at the entrance to which is the port of *Hong-Kong*. The latter serves as the large transhipment port for the trade of South China. It is here that the large ocean-going vessels call and the major portion of the foreign trade of Canton is with this port. The river near Canton also has two sand-bars, which make the passage possible only to vessels of light draught. For this reason, many cargo vessels unload portions of their cargo at Whampoa anchorage before they can proceed to Canton. There is much talk, however, of improvements being commenced in the near future in the port facilities of Canton, by making Whampoa a deep-sea port.

The large emigration traffic from the ports of *Amoy* and *Swatow* to Java, Philippine Islands, Straits Settlements, Rangoon and Siam makes these ports important from the point of view of quarantine, although commercially they are of less interest.

(b) *Internal Trade.*

There are frequent regular shipping services between Shanghai and southern ports, such as Ningpo, Foochow, Amoy and Swatow, and also regular trade communications between Hong-Kong and the three last-mentioned ports.

Between Hong-Kong and Canton there are several daily sailings, as well as a large junk traffic, and it is estimated that 5,000 passengers are carried in each direction daily.

North of Shanghai, there are regular sailings to Tsingtao, Newchwang, and Tientsin, and between Dairen and Tientsin, Chefoo and Newchwang.

Inland Waterways.

On the Yang-tze-kiang there are several trade routes — namely:

Shanghai	to	Hankow,	which is	585	miles long.
Hankow	to	Ichang	,,	387	,,
Hankow	to	Siangtan	,,	239	,,
Hankow	to	Changteh	,,	252	,,
Ichang	to	Chungking	,,	400	,,

Over the first of these routes a regular steamer service is maintained, while between Hankow and Japan a regular service of cargo steamers runs during summer months.

Hankow has also a very large river trade, through the medium of small steamers, launches and junks. The junks are very numerous, are of different varieties and varying cargo capacity. The large ones may carry up to 350 tons.

Along the Yang-tze and its tributaries, there are eleven treaty ports, including Shanghai, Nanking, Hankow, Changsha, Ichang. Some idea of the volume of junk traffic may be obtained from the fact that, during 1928, the junks entering and clearing from Shanghai numbered 48,372. Of these, about half or more came from the north, and the remainder from Chekiang province to the south. Tientsin, similarly, has a busy junk traffic, as has also Newchwang, where the junk trade is an indispensable factor in bringing the regions along the Liao River into touch with Newchwang.

Special Conditions of Coastal Traffic.

The coastal traffic between Chinese ports is carried on through the medium of (1) steamships and (2) junks, while the internal trade on the rivers and other waterways is maintained by means of steamships, launches and junks.

There is no necessity for special measures in regard to this traffic in the absence of infectious disease in the ports. When this is the case, steps can be taken to proclaim the ports where disease exists as " infected ", and automatically vessels coming from them will then be subject to inspection on arrival at subsequent ports.

It is not considered that the information available regarding the state of health of many of the coastal and inland ports is complete or accurate enough to enable the conditions which should govern this traffic to be laid down more definitely at the present time. So far as vessels proceeding to the Yang-tze river ports are concerned, examination at Woosung can be carried out.

Junk Traffic.

One of the suggestions made at the Conference on cholera prevention was that an examination of junks entering the Whangpoo river should be carried out, commencing in May, because of the possible risk of the introduction of cholera into Shanghai by the medium of this traffic. Examination of the question was carried out by a small sub-committee and information gathered as to what the traffic amounted to.

This showed that there were approximately 2,000 junks per month arriving in the river, a large proportion of which stopped at Woosung (inside the entrance to the river) while a small number carrying perishable cargo proceeded direct to Shanghai, where there is a special anchorage.

An important practical point was that as many as 200 junks may enter the river in one day. These junks have a crew which varies from three or four on the smaller ones used for fishing, to eight or nine on the larger ones carrying charcoal, cotton-seed, sand, etc. It is rarely that families live on these junks.

Although it was decided that the routine examination of junks was not feasible at the time, it was recommended that two points for study might be followed up:

(1) A small-scale examination over a limited period to determine the requirements for routine examination and the information which might be obtained thereby;

(2) A bacteriological study of the intestinal flora of persons living on junks and on sampans in the river and creeks, particularly for cholera vibrios.

The provision of two additional boarding-stations, one near Jessfield and the other at Lung-ha, would be necessary to control the junk and launch traffic to Shanghai. At each there would need to be a twenty-four hour service and a staff of three doctors and six water-police.

(c) *Diseases likely to be introduced into, or exported from, China.*

China is constantly threatened with invasion by cholera, smallpox, plague and, perhaps to a less extent, by cerebro-spinal meningitis.

Cholera may be said to be endemic in British India, Siam, Indo-China and the Philippine Islands. From all these places there is regular and constant communication with Chinese ports, and the progressive appearance of the disease in Indo-China, Southern Chinese ports and later Northern Chinese ports is at least suggestive of repeated re-introductions. At the same time, it cannot be overlooked that cholera may spread from the hinterland towards the coastal ports of China.

Smallpox is endemic in British India, Burmah and Hong-Kong, and it is from the latter port that the greatest danger of its introduction into China exists. There is a large passenger traffic between Hong-Kong and ports beyond it to Chinese ports, and at the present time the large tourist traffic constitutes an added risk.

The need for preventing introduced smallpox exists, despite the fact that the disease is endemic in China.

Plague. — Notwithstanding the number of countries in communication with Chinese ports from which plague might be conveyed, there has been a marked absence of the disease in recent years in the coastal areas. Nevertheless, the disease is endemic in various inland provinces, and constitutes a problem of definite importance. That there is considerable fear of the introduction of the disease, and particularly the pneumonic variety, is seen from the quarantine regulations of the various ports which prohibit the landing of passengers from an infected port until an interval of seven days has elapsed from the date of their departure.

Cerebro-spinal meningitis has to be considered owing to its seasonal prevalence in Far-Eastern ports, notably the Philippine Islands.

Exportation of Disease.

The question of the exportation of disease is an important question when considering a quarantine organisation in a country such as China. It narrows itself down to a consideration of what might be done at the ports of departure because of the absence of any form of public health organisation in the hinterland which could take effective measures against the export of infected goods or against the departure of infected persons or persons who have been in such contact with infected persons as to render them liable to themselves become infected.

In this connection, smallpox appears to be the disease most likely to be conveyed overseas, while cholera and cerebro-spinal meningitis may require separate consideration during the time of their seasonal prevalence.

The control of smallpox would involve the vaccination of all passengers prior to their departure, and, in the case of Chinese ports, would necessitate the detention of numbers of persons for such a period as is necessary to determine that they are protected against the disease. This is actually what is being done at Amoy in the case of passengers prior to their departure for the Philippine Islands.

The control of such a service is simple, merely involving an arrangement by which every passenger, before being provided with a ticket to travel, must produce from the health authority of the port a certificate that vaccination has been performed or an examination made which shows that the person is protected against the disease by recent successful vaccination. It is not necessary for passengers to be detained during the period of observation, although it is advantageous if this is the case, because it gives an opportunity for physical examination to be carried out and for the taking of samples, to determine the bacterial flora of the naso-pharynx or intestinal tract. At the same time, curable skin or eye conditions can receive appropriate treatment and prophylactic inoculations be given.

But when it is a question of determining freedom from cholera vibrios or bacillus meningococcus, the necessity for detention in an establishment supervised by the health authority of the port is apparent. This may be carried out by the health authority itself providing the establishment and charging the passenger an amount sufficient to cover the costs involved. The health authority, on the other hand, may leave the provision of the establishment and the conduct of it to an interested body such as the shipping companies, while retaining the right to make any necessary physical and bacteriological or other examinations of prospective passengers and to reject those not up to standard.

This brings us to a consideration of the whole problem of emigration in its relation to the quarantine service.

This movement is mainly in two directions, one from the northern provinces, particularly Shantung to Manchuria and Siberia, and the other from the southern ports, mainly Amoy and Swatow to the Dutch East Indies, Philippine Islands, Straits Settlements, Rangoon and Siam.

The northern traffic passes mainly through Chefoo by steamers or junks to Dairen, Antung and Newchwang.

These emigrants leave in the spring, and a number return in the autumn, although many remain in Manchuria for a number of years.

As the number is in the neighbourhood of 100,000 per annum, definite consideration is required of the measures necessary, both at the port of departure and arrival, to ensure that infection is not being transported.

In the south, the principal trade from Amoy may be said to be in human beings. The traffic is a well-organised business, involving the transfer of from 100,000 to 200,000 persons per annum from the districts around Amoy to the countries mentioned above.

There must also be considered the return traffic, which is a constant one, though the annual number returning is from half to three-quarters of the outward figure.

At southern ports, there is a medical inspection of emigrants prior to departure, and vaccination is performed. Unfortunately, this vaccination does not relieve the emigrants of the necessity of undergoing the operation again on arrival at their destination, unless there is an obviously successful result. The outward medical inspection and vaccination is carried out at the instigation and expense of the shipping companies, except in the case of emigrants to Manila, whose examination and vaccination is carried out by a medical representative of the United States Public Health Service.

These measures are not controlled by the quarantine service, and the countries to which emigrants are proceeding have no understanding with the service in regard to the conditions under which it is performed, nor of the standard of health required for successful acceptance. (This subject is referred to in more detail in the special report on Amoy.)

The Convention draws attention, in Article 21, to the necessity for submitting emigrants to a medical examination prior to their departure, and recommends special arrangements between countries of emigration, of transit and of immigration in regard to conditions of examination and measures of prophylaxis. The further recommendation is made that towns or ports of embarkation for emigrants should be provided with an adequate health and sanitary administration and, in particular:

(1) A service for medical examination and treatment as well as the necessary sanitary and prophylactic equipment;

(2) An establishment supervised by the State, where emigrants may be subjected to health formalities, be housed temporarily, undergo all necessary medical examinations and have their food and drinking supplies examined;

(3) Premises situated at the port where medical examinations at the actual time of embarkation may be made.

In addition, it is recommended that emigrant ships should be provided with a sufficient quantity of vaccines (anti-smallpox, anti-cholera, etc.) in order to permit, if necessary, of vaccinations during the voyage.

3. THE POSSIBILITY OF CO-ORDINATING THE QUARANTINE SERVICE WITH EXISTING SHORE HEALTH SERVICES.

The existing public health administration of the country is now centralized in the Ministry of Health, which, as constituted, comprises five administrative divisions, one of which is the Department of Epidemiology. The third division of this department is concerned with the prevention of epidemics and with quarantine, but has not been concerned with the actual administration of any of the existing quarantine services.

The Ministry is directly concerned with administration of public health in the seven special municipalities, which include Shanghai and Canton. But, whereas in Canton the whole public health service is under the control of the special municipality, in *Shanghai* there are, in addition to the health department of Greater Shanghai (which is under Chinese administration), the well-established public health services of the Shanghai municipal council (International Settlement) and of the French concession.

It should not be a very difficult task to arrange, however, for a large measure of co-operation between the quarantine service in Shanghai and the health departments of the three municipalities in regard to matters of mutual interest. These would relate to such questions as exchange of information, arrangements for assistance of laboratory services, arrangements in regard to hospital treatment of persons from infected vessels pending the erection of a quarantine hospital, regular destruction and examination of rodents in the port, supervision of the health of the workers engaged in the port work, and, in times of epidemics or emergencies, interchange of personnel.

In regard to *Canton*, the quarantine service could be administered on uniform lines with the central service by entrusting the control to an official who was responsible to the latter service. The staff would likewise be responsible, through this officer, to the central service, whence their salaries would come. The responsible officer should keep close liaison with the municipal department and might even be an officer seconded from that department.

4. ARRANGEMENTS WITH NEIGHBOURING COUNTRIES.

Any organisation which is established will be faced with the problem of what measures should or could be taken to prevent infection being transported between ports less than two to three days' journey from each other.

Nagasaki and Shanghai are only twenty-six hours' steaming distance apart. Hong-Kong and Canton are distant seven hours by boat, or four to five by rail. Similarly, Hong-Kong and Swatow, Amoy, are under one day's journey apart, while Hong-Kong and Shanghai are two to three days' steaming distance apart.

Satisfactory measures of quarantine are difficult to apply between ports so closely situated; but, in view of the possibilities of transfer of disease, must be considered and can be made more effective and less burdensome by an understanding between the countries concerned as to what is being attempted and how far the respective administrations can assist one another.

An arrangement, for instance, between the authorities at Canton and Hong-Kong regarding measures that might be taken for mutual protection against introduced disease and to prevent exportation of disease would do something to prevent duplication of effort, unnecessary expense to both administrations, and irritation and annoyance to shipping interests.

5. FINANCE.

The question of finding the money for a reorganised service is all-important. At the present time, this is usually obtained from the Customs revenue; but, with the transfer of the services from the Customs administration, this source of revenue is no longer available, except by arrangement with the Minister of Finance.

Two separate items must be kept in mind:

(1) Capital expenditure on equipment, quarantine establishments, etc.;

(2) Ordinary expenditure for salaries of staff, maintenance of plant, etc.

The first is bound to appear large, but could be spread over a short term, say two to three years, and is non-recurring expenditure. The second item will be an increasing amount for the first few years; but, once the service is completely reorganised, will remain more or less stable.

The one point that must be faced is that a quarantine service is a spending service and not a revenue-producing one. The only part of it that is self-supporting is the fumigation branch; but the whole purpose of the service is the prevention of epidemic disease, which can be regarded as insurance against unforeseen expenditure in money and lives.

V. PROPOSALS FOR A REORGANISED SERVICE.

A. CENTRAL ADMINISTRATION, POWERS AND FINANCE.

The report of the Medical Director indicates the policy of the Ministry of Health as follows:

(1) To transfer the quarantine service from the Ministry of Finance to the Ministry of Health, where it will be under central technical control.

(2) As a first step, to take over in the summer of 1930 the work in Shanghai, in order to bring about improvements in the system and to provide a training ground for the personnel to be assigned to other ports.

(3) To take over and provide efficient quaratine services in all ports within two years.

In pursuance of this policy, a temporary department has been created with headquarters at Shanghai, under the direction of Dr. Wu Lien Teh, who has been appointed as Chief Technical Adviser to the Ministry of Health. This department is charged with the duty of reorganising the quarantine services in the various ports of China, and its Director is responsible to the Minister of Health. This temporary department came into being on July 1st, 1930, when the Ministry of Health took over from the Minister of Finance the control of the quarantine service of the port of Shanghai.

It is proposed to reorganisee the service in this port and at the same time to train personnel to take over the quarantine service in other ports at convenient times within the next two years.

It will be seen, therefore, that the Central Administration has been already set up in the form of a new but temporary department located at Shanghai.

This central department will ultimately control the administration of quarantine for all the ports of China, and will provide a uniformity of practice and co-ordination of effort for the country as a whole. It is needless to discuss, therefore, the respective merits of a separate quarantine service and of a quarantine service as one of the activities of a central health service, as the former is the Ministry's policy.

Under conditions as they exist to-day in China in the domain of public health, there was no other way of providing a national quarantine service. The hope may be expressed, however, that, concurrent with the development of a modern public health service for China, centrally administered, the possibility may be kept in mind of co-ordinating the activities of the quarantine service in the ports with the established shore public health service.

A quarantine service, the authority of which stops at the water's edge, works under a serious handicap as compared with a quarantine service which is administered centrally and locally as a part of a well-organised, efficient shore health service. The latter can supplement the work of the quarantine service by the help of its personnel, the use of its hospitals and laboratories to an extent that makes the application of quarantine measures less stringent and more effective.

It may happen that, in China, the quarantine service, when completely reorganised, will form the nucleus of the shore health service in the ports.

This aspect of the matter might be made more likely of accomplishment if the services of the quarantine staff are available to the shore administrations at least in an advisory capacity in each of the ports as they are taken over.

Functions of the Central Organisation.

The functions of the Central Organisation will be:

(1) Administrative control of the quarantine service for the country;

(2) To keep itself informed of the condition of the country in regard to disease and to notify the Eastern Bureau of the first recognised cases of plague, cholera, yellow fever and typhus, and keep it regularly informed in regard to cases of smallpox, cerebro-spinal meningitis and other infectious diseases;

(3) To keep itself informed of the conditions of disease in other countries and regularly advise each port service in regard thereto.

The central service will keep each port service advised in regard to the regulations governing quarantine, in regard to the application of the regulations and respecting any alteration in the regulations or the application of them. It will ensure that the action taken in each port is co-ordinated with that of other ports in respect of vessels which call at more than one port, and for this purpose will arrange to be kept regularly informed of the work of each port. It will provide necessary plant and equipment required for the effective working of each port. It will prepare estimates of requirements in advance and ensure that money is available for payment of salaries and general expenses and for maintenance of equipment, etc.

In addition, a close personal supervision will be kept on the work carried out in each port to ensure that uniformity of procedure exists and that a high standard is being constantly maintained.

The Central Organisation having been decided upon, the next step was to provide it with the funds and the powers necessary to enable it to function.

Finance.

The source from which the money will come to finance the service is the Chinese Maritime Customs. Arrangements have been made with the Minister of Finance to make available to the quarantine service regular monthly credits to enable it to carry on. For the port of Shanghai the credit will be $ 5,000 per month.

As individual ports are taken over by the Ministry of Health, it will be necessary for further funds to be set aside from the Customs revenues, and it is the intention of the Minister to make the necessary representations to the Minister of Finance.

Capital Expenditure.

As regards capital expenditure for establishments and equipment, the Minister proposes to ask for the sum required from the same source. It is possible that the continued financial drain on revenue due to the civil war may delay the provision of money under this heading, but the Minister hopes that, in 1931, a sum of money will be available for quarantine establishments.

Consideration is now being given to the possibility of allotting a certain amount from port dues to the Ministry of Health for quarantine purposes.

Powers.

The question of the powers to be given to the quarantine service was a matter of urgency at the time of the writer's arrival in China. Arrangements had been definitely made for the new organisation to commence to function on July 1st, 1930, and from that date to take over the responsibility for the service in Shanghai. An early task therefore was the preparation of quarantine regulations giving the Ministry of Health power to carry on the service. The existing regulations which left the powers in the hands of the superintendent and Treaty Power Consuls did not lend themselves to transfer of those powers to the Minister of Health. An examination showed that they were not in accord with modern practice as set out in the Sanitary Convention of 1926, and that to endeavour to amend them would perpetuate certain unsatisfactory features.

The Minister consequently decided that entirely new regulations should be framed which would enable the service to be conducted from the commencement in accordance with existing ideas and methods of procedure. Regulations were consequently drawn up and came into force on July 1st, 1930. They are made under the authority of the Minister of Health, and may be amended as provided in Regulation 72. They have not been submitted to the Legislative Yuan, nor is it proposed that they should be until they have been (with any modifications deemed desirable) in operation for a period of two years.

They may consequently be regarded as tentative regulations designed to permit the new organisation to function immediately.

Review of Regulations.

A review of the principal clauses may not be out of place, and from this it will be gathered that the International Sanitary Convention of 1926 is regarded as being generally applicable to conditions in China.

Although the port of Shanghai is the only one at the present time whose health services are under the control of the Ministry of Health, it is intended to apply the new regulations to the other ports when these are taken over at a later date.

Infected Ports.

The power is taken by the Minister to declare a place infected with disease. The regulations previously in force provided that only vessels from infected ports should be subject to medical inspection on arrival. The present regulations, whilst making every vessel from a foreign port subject to medical inspection on arrival, provide, further, that every vessel from a proclaimed place shall be so subject.

This will cover the arrivals from Chinese ports when they have been proclaimed "infected". Obligations are laid on masters of vessels from proclaimed places to take certain specified measures to prevent infected persons or goods from being carried by the vessel. In default of taking such precautions, the quarantine officer is empowered to take any necessary steps to ensure that infection is not introduced.

Exportation of Disease from China.

Similarly, the obligation is laid on the Quarantine Service of China to take all measures possible, including those specified, to prevent the exportation of disease.

The decision to require every vessel from a foreign port to submit to medical inspection was the definite policy of the Minister.

It was covered, however, by the power to exempt any vessel or type of vessel. Such an exemption might reasonably be expected to operate in respect of vessels engaged in the service between Nagasaki and Shanghai, which journey occupies twenty-six hours, so long, of course, as no quarantinable disease exists in Nagasaki or neighbouring Japanese ports, and in respect of vessels trading regularly between Hong-Kong and Canton, an eight-hour run. This power to exempt is important and should meet an objection voiced to me in Shanghai by a representative of shipping interests. The objection was that the necessity to await inspection involved delay, and that only vessels which did not carry a surgeon should have to await inspection. This, of course, means that the shipping companies would only have to employ a surgeon to place their vessels outside the scope of the regulations. To this objection two points were made: firstly, that it was open to the companies to satisfy the Minister in any given case that he should exericse his powers of exemption; and, secondly, that it was open to the quarantine officer to carry out such a form of examination as was necessary to satisfy himself regarding the sanitary state of the vessel and the health of its crew and passengers. The form of examination would almost certainly depend on the presence of a surgeon and on the information he was able to supply. Shipping interests, I was informed, were apprehensive regarding the change of control, and considered the regulations should have "required" the health authority of the port immediately to grant pratique to a vessel on the certificate of the surgeon that the ship was "healthy".

This matter is referred to as showing the point of view of local shipping interests, which is hardly one a responsible Government could accept.

Wireless.

The use of wireless by the masters of vessels to notify the health authority of the arrival and sanitary condition of his vessel is provided for.

Local conditions necessitate, however, that this message should be sent about three hours before the vessel's arrival, and even then there is doubt as to whether the transmission will be effected.

Diseases.

The quarantinable diseases and their incubation periods are as prescribed in the Convention, with the addition that the Minister may include other diseases if the necessity arises.

In order also that suitable precautions may be possible against other infectious diseases, it is provided that persons suffering from them "may" be removed to a quarantine station for isolation treatment.

Powers.

The necessary powers are taken to facilitate the boarding of vessels by the quarantine officer and to ensure that he obtains full information regarding the sanitary history of the vessel.

Bills of health are not required to be carried, but an outward bill of health will be issued on the application of the master or agent of a departing vessel.

The measures to be taken against special diseases follow the Convention very closely.

It is necessary to employ observation, however, when dealing with deck passengers who cannot be kept under surveillance.

In regard to smallpox, there was a local difficulty to surmount — viz., the tourist who may have been exposed to infection in the fourteen days prior to arrival but who arrives on a "healthy" ship, can show no evidence of recent vaccination, and who obstinately refuses vaccination. Such a person is not permitted to land except under observation or surveillance.

Fumigation.

The question of whether fumigation should be made dependent on a previous inspection of the vessel to determine the necessity therefor caused some consideration. This was due to the fact that there is no personnel trained to make a detailed inspection for evidence of rat infestation. Nevertheless, this is only a matter of time and, in consequence, it seemed desirable to look ahead and not to continue fumigation on the routine basis, as was the previous practice.

The examination of emigrants prior to departure is an important question in China and has been referred to in detail elsewhere.

The power is given to inspect medically emigrants under instructions from the Government and to give any prophylactic treatment desirable. So that the inspection may be adequately performed, the prospective emigrants may be detained in a quarantine establishment.

The question of arrangements with countries of transit and immigration is a matter which comes within the purview of the Ministry of the Interior.

Methods of disinfection and tariff of charges are included together with forms and reports to be used, and it will be seen that the fumigation certificate adopted is the international one.

B. LOCAL ORGANISATION OF PORTS.

(i) *General Considerations for the Country as a whole.*

The International Sanitary Convention (1926) recommends in Article 50 that the number of ports which each country should furnish with an organisation and equipment sufficient for the reception of a ship, whatever its health conditions may be, should be in proportion to the importance of its trade and shipping.

At least one port on each seaboard so equipped is considered a necessity.

If we apply this standard to China, there should be at least one port completely equipped and, from what has been stated previously, regarding its commercial importance and geographical position, there can be no doubt that this port should be Shanghai.

Shanghai lies approximately midway between the north and south of the country, being 750 miles from Newchwang in the north and a little more than 900 miles from Canton in the south.

Four days' steaming, therefore, for a vessel averaging only ten miles an hour would bring it to Shanghai from either the northern or southern limits of the country. It is desirable, however, that, in a country with such a long seaboard and such large commercial interests, there should be other ports equipped to meet quarantine emergencies. This seems the more necessary in the north, because there is a considerable direct trade between Japanese ports and northern ports of China: and, further, because there is a large movement of population between the northern provinces and Manchuria, mainly passing to and from Chefoo and Newchwang and Dairen. In the south, also, there is a constant movement of population in large numbers to and from Amoy and Swatow on the one hand and Java, Manila, Straits Settlements, Rangoon and Siam on the other. To control this traffic, it is desirable that at least one port in the north should be provided with an organisation and equipment capable of dealing with the sick and close contacts of an infected vessel, and that one port in the south should be equipped medically to control emigration. Tientsin, as the most important commercial centre of the north, is the port which should be equipped in that region, once it is under the control of the National Government; but, should much delay be occasioned, the existing accommodation at Tsingtao should be put in order so that a few hospital buildings and limited contact accommodation are available. In the south, Amoy is the more suitable port, partly because, at the moment, there is no special control of the emigration traffic and partly because there may be financial assistance forthcoming locally to provide a quarantine establishment. The presence also of the university from which some technical assistance might be obtained is a further reason for selecting this port.

In addition, there should be provided at Antung, Newchwang, Chinwangtao, Chefoo, Wei-hai-wei, Swatow and Canton an equipment at least capable of receiving "healthy ships" and subjecting them to the prescribed sanitary measures.

Type of Organisation and Equipment.

It is desirable, before considering the organisation and equipment of ports in detail, to discuss generally the application to Chinese ports of the recommendations contained in Article 51 of the Convention. It is there recommended that, in large seaports, there should be set up:

(*a*) A regular port medical service and permanent medical surveillance of the health conditions of crews and of the inhabitants of the port;

(*b*) An outfit for the transport of the sick and suitable premises for their isolation, and for keeping suspected persons under observation;

(*c*) Installations necessary for efficient disinfection and disinsectisation, bacteriological laboratory and a force prepared to attend to urgent vaccination against smallpox or against other diseases;

(*d*) A supply of drinking water of quality beyond suspicion for the use of the port and a system affording all possible security for the removal of waste, filth and waste water;

(*e*) A competent and adequate staff and necessary equipment for the deratisation of ships, yards, docks and warehouses;

(*f*) A permanent organisation for the detection and examination of rats.

The additional recommendation is made that warehouses and docks should, as far as possible, be rat proof and that the sewer system of the port be separate from that of the town.

These recommendations obviously presuppose that a public health service is already in existence, of which the port health service is a branch.

Where there is a quarantine service under entirely distinct administration, as in China, immediate difficulties arise in completely applying the recommendations.

(*a*) For instance, a permanent medical surveillance of the inhabitants of the port is, unfortunately, not possible in existing circumstances.

On the other hand, a regular port medical service is possible in all the larger ports, including those mentioned specifically above.

In the most important port — Shanghai — and perhaps in the ports of Canton and Amoy, where a more complete establishment is being suggested, the permanent medical surveillance of the health conditions of crews of vessels may, in the course of time, become possible of realisation.

It implies the existence of a staff of some size and suitable launch equipment. In the port of Shanghai, for example, there is an average number of new arrivals of sixty vessels a day, which may be berthed anywhere along a stretch of river ten miles long. If to this number be added the larger junks, from fifty to two hundred of which may arrive in any given day, it will be gathered that the service in question must be regarded as an ideal to be aimed at in the future. Nevertheless, this matter has been kept in mind and will be referred to later in the detailed recommendations made for the ports of Shanghai and Canton.

(*b*) The second recommendation raises the question of whether or not a quarantine station is a necessary part of the quarantine equipment of a large port.

It can be said at once that suitable premises for the isolation of the sick and for keeping suspected persons under observation do not exist in sufficient number in Chinese ports. In Shanghai, it is the opinion of public health workers that insufficient isolation hospitals exist to meet present needs. The available accommodation is in the proportion of one bed per 10,000 population. In certain other ports where hospital accommodation exists, it is often unsuitable for housing infectious cases.

The question of keeping suspected persons under observation makes it necessary to understand what the conditions are which a quarantine service may be called upon to face.

In China, there is one outstanding feature of the sea-borne passenger traffic — viz., its volume. Many hundreds of deck passengers are conveyed daily from one port to another on vessels of all sizes and descriptions. Some of these come from the southern ports, where cholera, smallpox and plague are endemic and may at any time be the medium for conveying the infection of one or other of these diseases.

With the exception of Hong-Kong, which is a " transit " port, there is a quarantine establishment in all the ports visited during the recent interchange. In some ports, these establishments are in almost continuous use, more particularly for the detention of passengers from infected areas, even though arriving on " healthy " ships. In other cases, passengers are landed for bathing and disinfection of clothing. But whatever was the use to which the establishment was put, there was common agreement that the provision of such an establishment was necessary.

Hong-Kong is the exception. There, although no quarantine establishment exists, an empty warehouse situated at some distance from the city has been under consideration for such a purpose and is regarded as a standby for use in emergency. In addition, it is proposed to provide accommodation for 200 to 300 persons in a building to be erected to serve as a hospital for shore and ship cases, and this be used to accommodate contacts from infected or suspected ships.

At the present time, in the absence of such shore accommodation, an infected ship is held for such time as is required, and quarantine observation is carried out on board. It is difficult to conceive a more unsuitable place, however, than a crowded ship on which to detain contacts of any infectious disease, in the spread of which human agencies play a rôle.

There are, further, the interests of the shipowner to be considered. In these days, most ships engaged in passenger traffic at least can be depended upon to run to a schedule to which they adhere more or less closely. One need only think of the delay that could be caused and the expense that would be involved by holding such a vessel in quarantine for the period necessary to bring under control an outbreak of any of the diseases covered by the Convention, to hesitate before accepting quarantine on board ship as a satisfactory alternative to detention in a shore establishment.

In Far-Eastern ports, two factors come into play, which have an important bearing:

(1) The large numbers, up to 2,000 people, of the immigrant type, who may arrive on one vessel;

(2) The absence of suitable facilities for surveillance on shore, both from the absence of sanitary guarantees on the part of passengers and the impossibility of providing a means of medical inspection for persons released under surveillance.

In China, where there is no shore public health service, it is impossible to provide an adequate system of surveillance.

Their knowledge of local condition no doubt accounted for the unanimous expression of opinion of members of the interchange group at the final Conference, " that a quarantine station was a necessity in large ports of the Far East ".

It may be concluded, therefore, that at least one quarantine station fully equipped is a necessity for China, and this should be at Shanghai.

There is also need for one port in the north to have suitable premises for the isolation of a small number of sick persons and for the observation of their immediate contacts.

(*c*) Where a quarantine station is established, the necessary installation for efficient disinfection and disinsectisation would be provided, as would also a small bacteriological laboratory.

In some of the other ports, where a regular medical service is provided, arrangements might be made with a shore hospital for bacteriological diagnostic work to be carried out. It does seem necessary, however, to stress the importance of entrusting the bacteriological work only to thoroughly trained competent workers.

The provision of a " force " to carry out urgent vaccination against smallpox and other diseases seems a matter for joint action between the quarantine staff and the shore health authority where such exists.

(*d*) The provision of a pure water supply and an efficient system of waste disposal is again a matter for the shore health authority and does not fall within the competence of a separately constituted quarantine authority.

(*e*) The provision of a competent staff for deratisation provided with the necessary equipment would form an essential part of the organisation at Shanghai. It does not appear necessary or desirable, however, to duplicate this organisation, at least under existing conditions. On the other hand, the staff at smaller ports should know the procedure of fumigation and be able to carry out emergency fumigation, for which purpose sulphur generated by the pot method would suffice. There is need for the further knowledge of the respective merits and demerits of clayton gas, carbon monoxide and hydrocyanic acid gas which the Commission on Fumigation may be expected to produce shortly.

In all ports of the Far East plague infection is particularly feared. The methods adopted to fumigate vessels from plague-infected ports vary, however. The Dutch East Indies and Straits Settlements pin their faith to clayton gas, which they are satisfied has little harmful effect on most cargoes but is an efficient destroyer of rodents and their fleas. In Manila, the use of hydrocyanic acid gas is the method of election, while at Shanghai and Japanese ports carbon monoxide gas is used. All methods are used for loaded ships, with apparently satisfactory results, but a study of their comparative values has not been made.

With regard to the application of deratisation measures to shipyards, docks and warehouses, there is again the difficulty in Chinese ports of the jurisdiction of the quarantine service. Most of the wharves are privately owned, but arrangements could doubtless be made for the necessary steps to be taken regularly to trap rats and have them examined for species, flea index and state of health. The ratproofing of these areas should be particularly aimed at.

(*f*) A permanent organisation which would know the state of the rat population of the port should form part of the service provided in the larger ports and in the smaller ones where any full-time staff is employed.

Its value as an indication of danger has been realised in many of the Far-Eastern countries, although some large ports are content with the policy of waiting until plague appears before providing a service for rat destruction.

Emigration and Immigration Traffic.

The extent of this traffic needs to be considered in deciding the necessary organisation and equipment in the ports previously referred to.

The organisation recommended in the Convention is at present unprovided, but there is no question that there should be an official control of the medical examinations at present being carried out unofficially at Amoy at the request of the shipping companies. The Government, through its quarantine organisation, should provide the service for medical examination and prophylactic treatment, and should be in a position to house temporarily emigrants prior to their departure, in order to enable them to be kept under observation for a sufficient time for the necessary formalities to be carried out. At present, most of the emigrants reside in boarding-houses at Amoy for a few days prior to departure, without any supervision by the " State ".

The most suitable arrangement would be to provide a quarantine establishment at Amoy, where emigrants could be housed prior to departure at their own expense. The cost to the emigrant would probably not be greater than the present costs levied by the boarding-house proprietors, while the advantages of medical supervision, prophylactic treatment and curative treatment for minor maladies would be included. If, as seems probable, there are financial interests concerned in the traffic which advance the money necessary to enable emigrants to proceed overseas, it should be possible to come to some mutually satisfactory agreement regarding the expense involved.

In this connection, attention is directed to the arrangements at Manila for emigrants.

There are two systems in operation. In one, the shipping companies provide detention establishments for emigrants proceeding to the United States of America. Here they are housed, medically examined daily, vaccinated against smallpox, are submitted to bacteriological examinations, and, if regarded as physically and mentally sound by the representative of the United States Public Health Service, are allowed to embark. The expenses are borne by the shipping company, which charges the emigrants a daily rate to cover maintenance and the cost of the bacteriological examinations.

The other system concerns emigrants proceeding under contract to the sugar plantations at Hawaii.

These emigrants are similarly housed, medically supervised and treated, and provided with an outfit at the expense of the Sugar-Growers' Association.

Either system could be modified to suit the traffic from Amoy; but, if local interests are prepared, as seems possible, to loan the money to provide a quarantine station under the control of the service, it would be desirable that this should be carried into effect, as the station would be available also for the isolation and observation of immigrants from infected or suspected vessels.

But if, on the other hand, the proposals made in this connection do not come to fruition, then negotiations might be entered into with the financial interests concerned in the traffic and with the shipping companies by which an establishment is provided, but kept under the supervision of the quarantine service. Here emigrants will be housed, medically supervised and treated with prophylactic agents prior to their departure. At the same time, negotiations might be entered into with the countries of transit and adoption, with a view to formulating conditions of examination, prophylactic treatment and standards of health which will reduce the treatment needed on arrival and the rejections for health reasons to a minimum.

(ii) *Special Consideration for Various Ports.*

With the object of giving a more complete picture of certain aspects of the problem, the following detailed reports have been prepared setting out the present position and proposals for reorganisation in the case of:

(*a*) *Shanghai:* the central focus in any quarantine service for China.

(*b*) *Amoy:* where there is a constant emigration and immigration traffic.

(*c*) *Canton:* where the present service is under municipal control.

(*d*) *Newchwang:* where the quarantine station forms part of the organisation of the North Manchurian Plague Prevention Service.

Finally, a summary is submitted of the proposed reorganised service for the country as a whole and for individual ports.

(*a*) **Shanghai.**

Shanghai is situated in latitude 31° 14′ 20.38″ N., longitude 121° 29′ 0.02″ E., on the left bank of the Whangpoo river, fourteen sea-miles above the mouth at Woosung.

The urban area stretches about eight sea-miles along the river. On the right bank of the river is Pootung, which, from the point of view of commerce, is a part of Shanghai.

Local Government.

Greater Shanghai is a special municipality responsible to the Central Government. It comprises the Chinese city and the following suburban areas — viz., the southern suburb (Natau), the northern outer suburb (Chapei), the eastern suburb (Pootung). There are also two foreign settlements — one International and one French. Each of the latter has its own system of local government by an elected municipal council. Each of the three municipalities makes provision for public health services in the area under its control. The population of the International Settlement amounts to 863,645, of whom 32,885 are foreigners and 830,760 Chinese (report of Commissioner of Public Health, 1929).

The French concession has a population of 357,996, of whom 9,920 are foreigners and 348,076 Chinese.

The Chinese city was stated by the Health Commissioner to have a population of approximately 1,800,000 persons. The training and ideas of the health authorities in the three municipalities of the city vary, and there is a lack of co-ordination of effort which would preclude any one of the three from speaking authoritatively on the public health problems of the whole city, or of the efforts made to deal with them.

This condition of affairs makes it quite clear that no system of municipal control or supervision of the quarantine services of the port of Shanghai can be considered at present.

If Greater Shanghai eventually comprises the whole of the city, the question of the relationship of the municipality to the quarantine services might be reconsidered.

The existing quarantine service for Shanghai is under the control of the Maritime Customs, with the Minister of Finance as the ministerial head; but in the reorganised scheme the control will be transferred to Dr. Wu Lien-teh, who will be responsible to the Minister of Health. That a service entirely separate from the shore municipal services is a necessity is evident; but the hope is held that the quarantine service may work in the closest association with the health departments of the three municipal authorities, and tend to form a connecting-link between them rather than continue as an entirely separate institution.

Vital Statistics.

It is not at present possible to obtain reliable figures for the whole city of Shanghai, and, in consequence, any given can only be regarded as approximate and as applying to certain areas. The report of the Health Commissioner to the Shanghai Municipal Council for 1929 gives the death rate for foreigners as 18.98 and for Chinese as 16.42 per 1,000 population.

The density of population within settlement limits is given at 155 persons per acre.

This report draws attention to the serious epidemics of cerebro-spinal fever and cholera which occurred in 1929.

The former disease affected 1,099 persons, of whom 512 died, while the latter resulted in the notification of 3,513 cases with 307 deaths. Notifications were also received of 102 cases of typhoid and 15 of paratyphoid among foreign residents, and, in addition, 512 Chinese deaths were reported.

Of the diseases referred to in the Convention, cholera has been mentioned. Smallpox is endemic, and caused 12 deaths among foreigners and 165 among Chinese.

No cases of human or rat plague occurred, but four cases of typhus were recorded.

Prophylactic measures.

Vaccination against smallpox is being actively pushed in each of the municipalities.

Similarly, as a result of several conferences between the various health authorities, an inoculation campaign against cholera was commenced in the three municipalities in May 1930.

In regard to plague, trapping operations are carried on in the international concession, and regular laboratory examination of dead rats is performed.

Water Supply.

Each of the municipalities has a public water-supply service. At the present time, the Greater Shanghai municipality is constructing a purification plant.

The water in each case is taken from the Whangpoo river and is filtered and chlorinated before being supplied to the public.

The Shanghai Waterworks Co. have a fleet of water-boats, which supply vessels in the port as required.

Some of the wharves are supplied with this water, while others have a supply from tanks or wells.

Position of the Port.

Shanghai is situated on the easternmost central point of the Chinese seaboard, about equally distant in shipping time from both Western Europe and the United States of America.

Being situated close to one of the largest navigable rivers in the world, the Yang-tze, Shanghai can serve an area of three-quarters of a million square miles, which forms the watershed of that river. This river provides for 600 miles (up to Hankow) a means of water-carriage available in summer to vessels drawing up to 28 to 30 feet and in winter to vessels drawing from 8 to 10 feet.

Shanghai also serves as a transhipment port to many coastal ports both to the north and south of its location.

Quarantine Anchorage.

The south channel of the Yang-tze river, off the entrance to the Whangpoo, forms a safe open anchorage for large vessels.

A portion of this anchorage above the entrance to the Whangpoo forms the anchorage for vessels awaiting quarantine inspection or detailed in quarantine.

There may, at certain times and seasons, be strong winds which affect the working of vessels anchored here.

It is estimated that lighterage of cargo cannot be carried out for about 20 per cent of the time, and likewise fumigation of vessels at the anchorage may not be possible at certain times because of the danger to the fumigating barge.

The Wangpoo River.

This river has a navigable channel of approximately 1,000 feet wide with a depth of 20 feet up to the harbour.

Wharfage.

There are wharves on both sides of the harbour, mostly provided with floating pontoons. Much of this wharfage is not ratproof, but some is being transformed into modern reinforced concrete wharves, and much more should be.

A great deal of the cargo is handled by lighters from the outer side of ships at wharves or moored in midstream.

The greater part of the wharfage is privately owned and operated. A portion of the river front is used for industrial purposes and a great deal is as yet undeveloped.

Creeks.

On the Shanghai (City) side there are within the harbour limits three creeks — viz., the Yang-tzepoo, Hongkew and Soochow creeks.

The two first-named are small, but the latter has a through width at low water of 100 feet (approximately) and through depth of 4 to 5 feet at low water, to Soochow, where it joins the Grand Canal.

On the east or Pootung side there are within the harbour limits six creeks — viz., the Hsi Kou, Yang Ching, Lu Chia Pang, Lao Pao Tu, Chang Chia Pang and Pai Lien Ching. These are all small, winding creeks, but the first and last give access for cargo boats to considerable areas near the coast.

These have an important bearing on the question of control of junk traffic.

The Soochow Creek, in particular, and to a lesser extent all these creeks, harbour numerous sampans (small boats), on which a permanent population resides, which must reach a very large figure. Both shores of this creek are intensely developed for the lower seven miles; flour, silk, cotton and other mills are numerous, supply and delivery being by lighter, and also large warehouses or godowns for storage of cargo.

Sheds and Warehouses.

Almost all the wharves have transit sheds and also large warehouses or godowns for storage of cargo, but at present there are no railway wharves within harbour limits. There is, however, at Woosung a railway frontage with a length of 3,000 feet, of which 750 feet is developed as a wharf, and another above the harbour (at Lungwha) 2,500 feet long with one 60 foot pier. The first is accessible at low water to vessels drawing 19 feet and the second for vessels with a draft of 20 feet.

The railway wharves have their importance in connection with the spread of plague, but the network of waterways throughout the country limits their importance.

Waterways.

The Yang-tze river is the main feeder to and from the interior; 2,000-ton steamers can reach Hankow (600 miles from Shanghai) all the year round. Smaller vessels can reach Ichang (950 miles from Shanghai), and specially constructed shallow-draft steamers run between Ichang and Chungking (1,310 miles from Shanghai). Various branch streams are navigable for about 100 miles by junks and steam launches. Shallow canals also connect up all parts of the southern delta. This system makes possible the conveyance of a disease like plague for hundreds of miles into the interior from Shanghai in the event of infection of the latter.

Trade Position.

Shanghai is the principal entrepôt for the trade of North and Central China, and of the gross trade about 40 per cent is re-export business. The actual number of vessels which entered and cleared Shanghai in 1928 reached 89,330.

This figure is subdivided as follows:

Maritime Customs, under general regulations:	
Ocean steamers	11,717
River steamers	4,276
Sailing vessels, foreign type	905
Launches	2,208
Native craft, including chartered junks	3,162
Under inland steam navigation rules:	
Foreign and Chinese	18,690
Native Customs:	
Junks	48,372
Total	89,330

Junk Trade.

About 50 per cent of these vessels ply between Shanghai and Kiangpei northwards.

Some 44 per cent connect to the Chikiang province (south) and about 4 per cent with Shantung.

Others come from Fukien, Kwantung and Kiangsi.

The principal imports by junk are live poultry, fresh eggs, firewood, hams, vegetables, timber and poles; while the principal exports are bags, bamboo, bricks, flour, straw hats, matches, paper, tiles and sugar. Most of the junks anchor either at a special anchorage in the harbour (off the Nanter Bund) or at Woosung.

Administration of the Port.

Berthing and traffic control. — The harbour master — an official of the Maritime Customs — is charged with the responsibility for berthing and traffic control in the port.

River Improvement.

The Whangpoo Conservancy Board is responsible for the regulation of the river and for the erection of wharves.

The Board carries out dredging and reclamation works.

Sale of Foreshore Lands.

Certain frontages belong to the Government, which has vested them in the Board, through whom they can be purchased.

This is important in connection with the proposal to obtain a portion of the foreshore for quarantine purposes.

Quarantine Service.

The following description refers to the time prior to June 30th, 1930.

The quarantine service is under the control and supervision of the Commissioner of Customs, the harbour-master acting as the administrative officer in direct charge of the service.

The sanitary regulations for the port leave certain powers in the hands of the port health officer, who is the technical adviser to the harbour-master and the officer responsible for the medical inspection of vessels from proclaimed ports.

The port health officer is appointed to this office with the approval of the Treaty Power Consuls.

Organisation and Equipment of the Quarantine Service.

The regulations giving powers to declare ports infected and governing the quarantine procedure were promulgated prior to the Convention (1926) and differ in certain essential matters therefrom.

There are two separate branches of the service, each responsible to the harbour-master — viz.:

(1) Medical inspection and sanitary station branch;
(2) Fumigation service.

1. *Medical Infection Branch.*

The medical inspection branch is under the direct control of the port health officer, who resides at Woosung.

On this officer devolves the responsibility of recommending what ports shall be declared infected, for what disease and at what time, and similarly of recommending when such declaration shall be withdrawn. He is responsible for the medical inspection of vessels and for carrying out necessary measures in the case of infected vessels.

He is responsible for the working of the foreign sanitary station and for deciding when patients admitted to the Chinese station are ready for release.

Staff and Equipment. — The boarding staff comprises the port health officer, the sergeant (water police), an assistant, and a hospital attendant.

The assistant staff live and form part of the staff of the sanitary station. In the inspection of a vessel, the sergeant and the assistant are engaged in the muster of passengers and in ensuring that all on board are inspected. The hospital attendant assists in the examination by taking temperatures and keeping in touch with passengers for whom a more detailed examination is required.

Type of Inspection. — The ordinary line inspection, with detailed examination of any person whose condition suggests its necessity, is carried out.

Action in the Case of Infected Ships. — Arrangements have been made with the Commissioner of Health of the Shanghai municipal council to admit foreign patients to the isolation hospital. In the case of Chinese patients, they are admitted to the Chinese station.

Contacts. — Contacts may be detained in case of emergency at the sanitary station, but it is difficult to keep them within the boundary of the station.

Treatment of Ship's Quarters. — Free use is made of izal for scrubbing and spraying parts of a ship regarded as contaminated.

Boarding Launch. — A steam launch of 100 tons is used for boarding purposes. This vessel can go out in any weather to vessels at the quarantine anchorage, but is somewhat difficult to handle, and consequently getting alongside may take an unnecessarily long time.

The crew of this launch numbers fifteen, but this number appears to have been required when two shifts are being worked. Since one shift is being worked at present, probably a reduction could be effected. The launch draws about 12 feet of water, and is anchored in the river when not in use. This necessitates the constant hiring of two boats to cover the distance from the landing-stage to the launch.

Vessels Inspected. — During 1929, sixty-six vessels from Vladivostok were inspected and 413 from Hong-Kong and Canton.

Sanitary Station. — This is situated on the opposite side of the river to the port health officer's residence. It comprises a small block of land of less than 8 acres. This is divided into two areas, on one of which is the foreign station and on the other the Chinese station. The former is under the control of the port health officer. It is unfenced and contains quarters for staff, two buildings and six two-room huts for patients or contacts. If necessary, four beds could be placed in each room if used for contacts, so it is customary to regard the accommodation as suitable for twenty-four patients or forty-eight contacts. There is also a disinfecting block, which is not fitted with suitable equipment to serve a useful purpose. Temporary accommodation could be erected in times of urgency.

Staff. — The sergeant and fifteen others comprise the staff. This includes a hospital boy, cooks, carpenter, washman, coolies and boatmen.

Comments. — On paper, this station may sound reasonably suitable, but there are important drawbacks to its successful functioning — viz.:

> First access. — There is not (and apparently never can be) any permanent landing-jetty owing to the continuous silting of the river. Hence patients or contacts must be landed in chairs or wade through the mud.
>
> Second access. — Water is not available for drinking purposes, nor is lighting provided other than by kerosene.
>
> Third access. — The station is neither isolated nor enclosed, and so contact with the residents could and would be made.

The Chinese station is financed by the Red Cross and is in charge of a Chinese practitioner.

Accommodation is available for from twenty-six to fifty-two persons in huts containing one and two bedrooms. It suffers from the same disadvantages as the foreign station.

(2) *Fumigation Service.*

There were no facilities at the command of the Customs department when, in 1910, it was recommended by the port health officer that fumigation of vessels arriving from infected ports should be carried out. At this time, however, a private company was carrying out fumigation of vessels to enable them to comply with the requirements of the United States Public Health Service and an arrangement was come to by which the fumigation required under the sanitary regulations of the port was carried out by this company. This has continued up to the present time, but the contract with the company finally expires on June 30th, 1930, after which date the service is to be operated by the newly created quarantine service.

At the commencement of its work, fumigation was carried out by means of sulphur dioxide. This was soon found to be unsatisfactory for loaded holds and evoked protests from the shipping companies and from the merchants to whom cargo was consigned. Shanghai is not, for most ocean-going vessels, a final port of discharge. Such vessels complete their unloading or commence their loading for the next voyage at Japanese ports, and, in consequence, whenever fumigation is carried out because vessels have come from infected ports, it is necessary to use a fumigant which does not damage the cargo carried. In this connection, an immediate difficulty arises, because the fumigation of loaded ships may have to be performed without the initial preparation to ensure penetration of the fumigant, which is essential for efficiency. In addition, the best fumigant is a matter of doubt, which may be removed by the experimental work being carried out under the auspices of the Fumigation Commission of the League of Nations.

In considering such difficulties, the company finally concluded that the most suitable gas would be a mixture of carbon monoxide and carbon dioxide, and, as a result, had constructed a machine which would deliver this gas. Later, improvements were fitted, and the latest model is capable of delivering 130,000 cubic feet of gas per hour, with a content of carbon monoxide up to 13.75 per cent.

This gas is cleared and cooled, and delivery can be made at a temperature of about 75°F.

The fuel used is charcoal, for preference, although coke may be used. No damage need be anticipated to any form of cargo by the use of this method, and its rat-destroying properties are quite certain wherever penetration is obtained.

This plant is installed on a barge and is towed about the harbour by a steam-tug.

This plant is capable at the present time of meeting all the fumigation requirements of the port.

An additional steam-tug has, however, been built, on which is installed a fumigating machine of similar type. This tug has not been used, and there would be definite advantages if the machine were removed and fitted on a barge. This would make the two plants available for fumigation purposes and, when used together, would halve the time taken The crew of the fumigating barge comprises eleven men, while the tug which tows it has a crew of twelve. The barge, tug and their crews have now been taken over by the National Quarantine Service, which has operated the plant from July 1st, 1930. The services of the manager of the company will not, however, be available. The manager has been actively concerned in directing and carrying out the actual work of fumigating vessels for the past twenty years, thus his departure will leave the fumigating plant without its responsible head.

The work of fumigation has been confined to larger vessels and has not included attention to the junks or lighters.

Sulphur Fumigation. — Sulphur fumigation is used on empty vessels, the sulphur being burnt in pots in the proportion of 3 lb. per 1,000 cubic feet of space to be fumigated. No facilities have existed, however, for examination of rats found dead after fumigation.

Vessels fumigated. — The average yearly number of vessels fumigated in the past five years equals 969. As previously mentioned, a large proportion of these vessels have been fumigated when laden with cargo and, in consequence, the results obtained cannot be accurately determined.

Other Quarantine Activities. — No other quarantine activities have been carried out in the port.

River Ports. — Quarantine services have not been installed in the river ports. The position of the boarding-station at Woosung would enable measures to be taken to inspect vessels entering the Yang-tze, but not to take measures designed to prevent exportation of disease from the ports along this river should they be infected.

Proposed Organisation and Equipment of the Quarantine Service for Shanghai.

The organisation and equipment considered necessary for the port of Shanghai are considered in detail.

Some discussion on certain questions is also included in order to provide an explanation for the attitude adopted or recommendations made. The service would comprise the following divisions:

(1) Administrative;
(2) Medical inspection;
(3) Quarantine station;
(4) Sanitary inspection and deratisation.

Administrative Division.

The administrative division at Shanghai will, in reality, be, for the time being, the same division as administers the Central Service. At its head is the Director of the National Service, who is responsible to the Minister. Under him, and controlling the work of the separate technical divisions there is an important post to be filled by a medical officer who has complete first-hand knowledge, and understanding of the work of each division. Such a knowledge can only be obtained by a thorough training in and study of quarantine methods as they are practised in other countries of the world. It is just such knowledge as the medical officers who undertake the individual quarantine missions under the auspices of the Health Organisation will be in a position to obtain. With the return of these officers, this extremely important post can be filled. The officer appointed will be fully occupied in supervising the training of the other medical members of the staff, and in ensuring the smooth working of the service. Until someone is ready to fill (in the broadest sense of the term) this position, and other trained personnel are available, the quarantine practice of the ports can be continued much along existing lines.

Cases of Infectious Diseases on Vessels in Port.

There will be need for a standing arrangement with the shore authorities regarding the admission and treatment of cases of infectious diseases which develop on vessels in port. Should any such cases be sent to the quarantine hospital for treatment, the shore authority should be informed of the action taken.

Venereal Disease.

Similarly, steps should be taken to provide for free treatment ashore for cases of venereal disease among the crews of vessels in port. There should be an arrangement by which the quarantine service and the shore hospitals keep each other advised in regard to cases among the mercantile marine so that continuous treatment may be availed of. The International Carnet should be used to indicate the treatment given, and, where necessary, medicaments should be furnished to permit treatment being carried out during the voyage to the next port.

Medical Inspection of Vessels.

With the enforcement of the new quarantine regulations, there will be a greatly increased number of vessels to be medically inspected.

It is difficult to be certain what the number will be, but this will soon be ascertained, once the new arrangements commence, and once it is decided to what extent exemptions are to be made in the case of vessels from ports of adjacent countries.

It may be expected, however, that the number will be in the neighbourhood of five hundred per month, and that, so far as the daily routine is concerned, many vessels will arrive during the night and be at the quarantine anchorage awaiting inspection at sunrise.

Experience of boarding all vessels from Hong-Kong alone has shown that as many as twenty-five to thirty vessels may be at the anchorage at one time.

It is necessary, in order to meet this situation efficiently and expeditiously, to greatly increase both the medical and assistant staffs at Woosung and to provide additional transport facilities.

Staff. — (*a*) The medical staff would require to be increased by the appointment of three additional quarantine medical officers.

The choice of these medical officers is likely to present some difficulties, as certain qualifications are essential which may not be necessary for medical men in practice ashore.

The qualifications include:

(1) Personality as shown by the possession of the right degree of tact and firmness to impress the masters of vessels and passengers with the knowledge that the quarantine officer knows what he wants to do and how he proposes to do it.

The quarantine officer will, in effect, take control of the position as soon as he steps on board a vessel, but he can do nothing except through the master, and with his co-operation and that of the passengers.

(2) Clinical knowledge and particularly diagnostic ability are very important. A quarantine officer should have a good general knowledge of medicine, with special knowledge of infectious and skin diseases, and of tropical medicine. Above all, he should be a man of decision, who after consideration of necessary factors, reaches a definite conclusion.

(3) Ability to assume responsibility is essential. On the quarantine officer's decision depends the action to be taken in regard to each ship inspected.

The quarantine officer can, when absolutely necessary, hold up a vessel and consult with his colleagues. He can take samples for diagnosis. He cannot, however, do either of these things simply because he lacks training, ability or faith in himself.

Delay to a vessel means demurrage; delay to passengers may have serious consequences, and hence the quarantine officer must be prepared to justify his action in any particular case.

The men with the necessary qualifications are not always those who are desirous of accepting appointments which mean that they may be called upon in all weathers to board vessels lying at a somewhat exposed anchorage.

(*b*) *Assistants.* — A team for boarding duty comprises at present the quarantine officer, two assistants and a hospital boy.

It would be necessary to at least duplicate the existing assistant staff.

Assistants who can help to muster and check the passengers and, while the quarantine officer is at work, search the vessel to ensure that everyone is inspected are indispensable. The hospital boy can save the quarantine officer much time by temperature taking and preparation of passengers in regard to whom more detailed examination is indicated.

Transport. — The existing launch, though it has done duty for many years, lacks certain qualities that are most desirable in a boarding-launch. It requires a large staff, is costly to run and is not easy to handle when going alongside.

It is understood that this launch is to be replaced by a motor-launch, but it will be necessary to obtain an additional launch when the service takes over the work if unnecessary delay is to be avoided.

This launch should be capable of going to the anchorage in any weather; but, apart from this, ease of handling, smallness of crew and minimum running costs should determine the type to be obtained.

Launch Equipment. — Each launch should have certain equipment constantly on board.

A stock of the necessary forms used by the quarantine officer will be kept on each launch.

Washable overalls, together with a supply of towels and soapy disinfectant solution are essential. Specimen tubes, swabs, glass slides, thermometers, stethoscope and an electric torch will also be found necessary from time to time and should be kept on each launch.

Exemptions from Medical Inspection,

If it is proposed to exempt from medical inspection any merchant vessels, it is probable that those engaged solely in the service between Japanese ports and Shanghai will come under consideration.

Certain conditions might be imposed, such as the carrying of a medical officer and the freedom of the ports of departure and call from infection with a quarantinable disease.

The vessels which appear to be least likely to bring infection are those from Japan, Canada and the United States of America, so long as the ports from which they come continue free from infection.

So far, the question of medical inspection has only been considered from the point of view of vessels entering the river Whangpoo and at Woosung.

This, however, while it covers traffic from foreign and certain Chinese ports, does not cover the water-borne traffic to Shanghai from a number of Chinese river ports.

Junk Traffic.

Such traffic is carried on by junks and lighters and assumes considerable proportions.

To control and supervise this traffic would involve the organisation of two additional boarding stations — one in the neighbourhood of Jessfield, where junks and lighters from Soochow, Wusih, Chiangchow, Chinkiang and Nanking could be examined; and the other at Lunghwa, where river vessels from Kashing, Sungkiang and other ports in Chekiang Province could be intercepted.

The possibilities and desirability of controlling this traffic can be ascertained by the medical officer appointed to examine the question of junk traffic in relation to the importation of cholera, and he might be requested to keep in mind the general question of the importation of disease as well as the specific question of cholera importation.

It has to be remembered, however, that rail communication also exists with certain of these river ports, and the value of controlling their water-borne traffic may thus be greatly minimised, if not entirely lost.

Fumigation (Deratisation Branch).

The existing contract with the Shanghai Disinfecting Company having expired, a short review of deratisation as practised may not be inopportune, as this function now devolves on the quarantine service.

The necessity for keeping the rat population of a vessel down to a minimum has been recognised by the health authorities of countries for many years, because of the rôle played by ship-rats in the transfer of plague.

The action taken to produce this results has not always been uniform.

For instance, acting under the authority of the 1912 Convention, some countries have literally interpreted the recommendation requiring the destruction of rats every six months, and subjected vessels to fumigation with this object in view at routine intervals.

In many cases, there was no enquiry as to the nature of the cargo carried or inspection as to the condition of the vessels from the point of view of rat infestation. In consequence, as might be expected, shipowners were interested to know the result of a process which took time and cost them money. Experience showed that many fumigations were performed without much evidence of rat destruction — in other words, they did not achieve their object. Representations on this head led to inquiries as to whether the rat population of a vessel could be determined by inspection; and, when it had been shown that this was possible, the way was open to insist that, in the absence of infection on a vessel, fumigation should only be required when its necessity had been determined by enquiry and inspection.

Should the inquiry and inspection indicate that the ship was maintained in such a condition that the rat population was kept at a minimum figure, a certificate of exemption from deratisation is issued, on which is given the reasons which led to its issue.

So that their ships might be able to keep their rat population at a minimum figure, a good deal of work has been carried out by many owners in ratproofing ships. While it follows that this is a much more satisfactory measure when incorporated with the construction of new vessels, nevertheless, much work has been carried out on ships already built to block runaways and open up small enclosed spaces.

The results obtained by inspection when fumigation is subsequently carried out are valuable, in that attention can be concentrated on those places which require it. In some cases, this may be one hold of a vessel only. Further, where traps are laid prior to fumigation, the catch enables the species of rat to be determined and examination for disease to be carried out.

In the port of Shanghai, fumigation has hitherto been carried out as a routine procedure. This practice should be superseded by the more scientific method of determining the necessity before ordering the operation. But here a difficulty is encountered immediately — lack of expert personnel.

This is a position that needs to be faced at once. The departure of the manager of the Fumigating Company on June 30th removed the controlling hand which, since its inception, has been responsible for all fumigations performed. Though his staff is to be continued under the Ministry, this contains no one, so far as my information goes, who can be depended upon to work except under " supervision ".

There is thus an urgent need for training or obtaining an expert in the practical application of the methods of ship fumigation and disinfection. This need not be a medical man, but should be a man of intelligence, with knowledge of the chemistry and physical action of gases, with ability to handle fractious members of ships and crews, tact to deal with ships' officers, and energy to enable him to see for himself that a vessel is properly prepared for fumigation. This involves also a knowledge of the structure of ships, and the willingness to apply this knowledge by searching the holds and quarters of ships before and after fumigation, and, if necessary, assisting in the mechanical work of the fumigation process itself. (The Minister has asked the Health Section to assist in obtaining the services of a suitable fumigation expert.)

The head of the fumigating section would be a medical officer, and this officer also requires to be specially trained in ship fumigation.

Next comes the question of trained rat-searchers. It is essential that a number of members of the fumigating staff should be trained as rat-searchers.

The training of these men could be carried out when the medical officer who is to take charge of the fumigation section has himself been trained, and when he has associated with him an expert in fumigation practice.

To sum up, the necessities of the fumigation section may be stated to be:

(1) The training of the medical officer who is to take charge.

(2) The immediate training of (or engagement of) an expert in the practice of ship fumigation. This is urgently required.

(3) The training of a number of the fumigating staff as rat-searchers, which can be done by the senior officers, particularly the expert.

Sanitary Inspection of Vessels.

This branch of the service will be entirely new, and will work in close conjunction with the rat-searchers and the staff employed on fumigation work.

What is required is to have a small staff of men who have some knowledge of ship construction and arrangement trained as sanitary inspectors.

It seems probable that about five young, enthusiastic men who have been engaged in the mercantile marine and attained the rank of junior officers would be sufficient to commence with.

These would be men who could be trained at the school in Nanking in hygiene, and could be expected to benefit considerably even by an intensive short course of training. This would enable them to make a commencement with their duties at an earlier date, but should be supplemented by " refresher " courses at intervals of, say, two to three years.

These officers would be allotted a section of the river to supervise, and would be responsible for keeping in touch with all vessels which tied up or anchored in that section.

They would know, by daily visits (prolonged, if necessary), the type of accommodation provided for crew and passengers (if carried); the general state of health of the members of the crew; whether any member of the crew was under treatment while the vessel was in port and the nature of the disease; the nature of the cargo carried and the ports at which it was shipped; the condition of the cargo, particularly that landed at the port; the port at which water was taken on board; whether the vessel was rat or vermin infested; the general sanitary condition of the vessels; the condition of the food stored for use of crew and passengers; the condition of the food and water taken on board at the port.

In case of an infected or suspected ship, these officers would be detailed for special duty to ensure that, so far as it was possible, infection was not introduced into the port by cargo unloaded or by goods or effects taken ashore.

Similarly, if the port itself were infected, their special duty would be concerned with the prevention of export of disease by the medium of goods.

The efficient carrying out of the duties of such officers would enable the Director of quarantine to know definitely the sanitary state of vessels in the port, so that he may be forewarned of any impending development and be in a position to meet it.

Process of Fumigation.

Vessels will be fumigated under varying conditions in Shanghai, as in other ports, but many will have cargo on board for other ports during the whole of their stay.

With regard to empty ships, no difficulty need arise.

The existing practice of using sulphur in pots could be continued or use made of the machine installed on the hulk for generating sulphur dioxide. In addition, the use of hydrocyanic acid may be considered.

The efficiency of any method depends on the degree of penetration obtained, and this in turn is partly dependent upon the thoroughness of the preliminary preparation of the ship and the completeness with which the operation is carried out.

The fumigation of cargo-laden ships by hydrocyanic acid gas is a matter that is at the moment under consideration by the Commission on Fumigation of the Health Organisation of the League of Nations. Quite a considerable amount of experimental work has already been carried out in the United States of America in connection with the programme adopted by this Commission.

That a fair degree of effectiveness can be obtained by the method has already been shown, and, in addition, a cause of the ineffectiveness is apparent — namely, the inaccessibility of pipe-casings and other rat harbourages which cannot be opened up in a loaded hold.

The effect of this gas on foodstuffs has been the subject of experimentation also, and this needs to be carefully determined.

The position, therefore, is that further experimentation and consideration of the results obtained is necessary before the conditions can be definitely laid down under which hydrocyanic acid gas attains its maximum efficiency in a cargo-laden vessel.

The decision as to whether the Government could be recommended to adopt fumigation by hydrocyanic acid gas will thus remain in abeyance until the conclusions of the Commission above-mentioned are available.

In the meantime, however, the possession of a machine for generating carbon monoxide and carbon dioxide and propelling these gases into empty or loaded holds of vessels requiring fumigation will enable the fumigating staff to carry out deratisation in a reasonably efficient manner.

The gases in question have the advantage that they do not injure cargo, are not absorbed by water, and are introduced under pressure.

From the point of view of protection against plague, there is the disadvantage that the gases do not kill fleas. But, until the relative values of fumigants are determined, it is clearly desirable to continue the use of the existing plant.

This plant would appear capable of meeting the needs of the situation for some time to come, but it would be of considerable advantage if the Hughes machine on the tug *Poo Chi* could be removed from that vessel and made available for the use in the port by placing it on a barge.

The immediate advantage would be that, in times of necessity, one machine could be in use at the quarantine anchorage when an infected vessel were requiring treatment and, in addition, the use of two machines in treating an ordinary vessel under fumigation in the port would halve the time required to pump the holds full of gas.

Trapping and Poisoning.

The use of fumigants is not, however, the only method of rat destruction on vessels. Traps set in places where rat infestation is suspected may serve two objects — first, to enable rats to be caught for examination, and, secondly, to clear a part of the ship of rats.

In vessels where a good deal of attention has been given to ratproofing measures, the use of traps may be sufficient to clear it of its surplus rat population and so render fumigation unnecessary.

Poison baits may assist in attaining such a result, while regular use of traps and baits may enable a vessel to be maintained in such a condition that the rat population is kept at a minimum and so is qualified to receive a certificate of exemption from deratisation.

Search for Rats.

A search for rats after fumigation is an essential part of the process.

The number and species of those found would be recorded for each vessel.

At the same time, a flea index should be kept.

Fumigation Certificates.

The certificate prescribed is the model recommended by the *Office international d'hygiène publique*, and can be utilised either as a deratisation certificate or as a certificate of exemption from deratisation.

Following completion of fumigation or an inspection which determines the fact that fumigation is not indicated, a certificate would be issued which should be signed by the director or by the quarantine officer in charge of the fumigation branch.

Certain countries may require such certificates to be visaed by their consuls, and this matter is one which will need to be taken up with the countries concerned — viz., United States of America, Netherlands East Indies and Japan.

It would be an advantage if the representatives of these countries could be invited to view the fumigation process in action, when desired by them. Once it is realised that the process is effectively performed, international recognition will be more likely to be given to the certificates issued, and one method of obtaining this is to encourage inspection of the measures taken by the representatives of foreign countries who are resident in Shanghai.

Measures in the Port.

(1) Deratisation of vessels belonging to the port.

The question of what measures can be taken to control the sanitary condition of the vessels belonging to the port will require to be carefully worked out.

The following types of vessels exist:

(*a*) Lighters to the number of more than 300 on the Port Register.
(*b*) Cargo-boats serving as small lighters to the number of 3,000 to 4,000.
(*c*) Sampans numbering about 1,200 used in ferrying traffic.
(*d*) Launches and motor-boats plying as public ferries.

(*a*) and (*b*) The lighters and cargo-boats could be fumigated as far as their under-deck space is concerned by gaseous fumigants, and, in addition, trapping and examination of rats and fleas would be a measure of value for the information obtained as to the prevailing species of rats and fleas.

It has to be remembered that many such vessels form the homes of families and, in consequence, gaseous fumigation has a limited application.

(*c*) In addition to the sampans plying for hire, there are many permanently located in the creeks. These form the habitation of families also and the need for an investigation into their sanitary condition is undoubted.

Here, also, if rat-catching were found possible, the results obtained would give an indication of the measures necessary for adoption.

Wharves and Warehouses.

So far as the wharves are concerned, the question of sanitary supervision, ratproofing, trapping, etc., would appear to be a matter for an understanding and arrangement with the owners, as the information obtained indicates that most of them are owned by companies and business firms.

At the same time, the ratproofing of the warehouses along and near the waterfront followed by the collection and examination of rats and their fleas could be taken in hand.

This matter is of prime importance, and not less important than the undertaking of the work is the co-ordination and supervision of it, if possible by the quarantine service.

Quarantine Station.

Before proceeding with a discussion of what quarantine establishment is necessary to meet the needs of Shanghai, a moment's consideration might be given to the purposes which may be served by a quarantine station fitted with modern equipment.

These are:

(1) Isolation and treatment of sick persons removed from vessels;

(2) Observation of persons suspected of being in the incubation period of disease;

(3) Observation of persons exposed to infection;

(4) Disinfection of vessels, persons, and things which are infected or exposed to infection.

When speaking of "disease" and of sick persons, we particularly mean the quarantinable disease — plague, cholera, smallpox, typhus and yellow fever — envisaged by the International Sanitary Convention, 1926; but we may also have to deal with other communicable diseases, such as cerebro-spinal meningitis, scarlet fever, diphtheria, enteritis, etc.

It must be determined to what extent persons coming under the above headings — Nos. 1 and 2 can be accommodated in hospitals on shore — before we can decide the type and extent of hospital accommodation needed in a quarantine station.

On this point it is found that, up to the present, it has always been possible by arrangement with the Commissioner of Public Health of the Shanghai municipal council to obtain accommodation for sick foreign persons at the isolation hospital, where approximately one hundred beds are provided.

In regard, however, to Chinese patients, it is quite a possibility that the beds available (numbering about 150) may all be occupied in epidemic times by shore patients, and hence difficulty would be encountered in obtaining accommodation for imported cases.

It can be concluded, therefore, that some provision of hospital beds for Chinese patients is a necessity.

In regard to No. 3 (observation of persons exposed to infection), consideration is necessary to determine the extent to which detention in a quarantine station can be replaced by release under surveillance, which imposes the obligation upon persons released to submit themselves to medical examination during the incubation period of the disease.

This point seems capable of being easily settled in Shanghai, where large numbers of passengers would inevitably be lost sight of, if released under surveillance, immediately they landed.

It can therefore be stated that some provision is necessary for the detention of passengers — in other words, a quarantine station for the port of Shanghai is a necessity.

This conclusion has been arrived at without regard to the fact that such an establishment may serve a very useful purpose, should it be found necessary or desirable to detain for observation persons who are embarking for other ports.

Selection of a Quarantine Site.

The selection of a site for a quarantine station involves consideration of at least the following points:

(1) Access by water, depth of water and shelter for vessels;

(2) Access by land, for supply of food, transport of staff;

(3) Size of the area, taking into consideration the need for administration buildings, hospital and observation blocks for sick and suspects, laboratory building, detention blocks for healthy contacts recreational facilities to keep contacts contented, buildings to house staff, disinfection and bathing blocks;

(4) Adaptation of the area to building requirements;

(5) The available sources of lighting, water, heating.

If we apply these essentials to the existing site, it is seen at once that access both by water and land is a source of difficulty. There is no water or lighting, and the type and extent of the accommodation is unsuitable for the purpose.

The latter shortcomings could, by expenditure of sufficient money, be overcome to the extent that the area available would permit the necessary extensions. Access, however, is, and, on the information supplied by the Conservancy Board, will remain, an insuperable difficulty. For this reason, the present site cannot be regarded as suitable, and it is recommended that another more suitable area be obtained on which to erect the buildings necessary to meet the present and future needs.

New Sites.

The question of a new site may, however, be surrounded with difficulty.

There appear to be no islands in the vicinity of the mouth of the Whangpoo which could be considered for the purpose, even if it were a desirable thing to establish a quarantine station on such an area. This confines the search to the banks of the river itself.

On one side of the mouth is an area of approximately 200 mow (33 acres) with a frontage of 1,500 to 2,000 feet to the river on one side and a frontage to the Yang-tze river towards the north-east. This area complies with the requirements regarding access by land and water, and, moreover, the frontage to the river has deep water alongside, which, if a wharf were constructed, would enable a large vessel to moor safely except on rare occasions.

The area, while somewhat limited, would enable the necessary buildings to be erected, while water and lighting are obtainable.

But this area is owned by the Conservancy Board, who visualise the river frontage as wharfage space which produces revenue, and, consequently, negotiations would have to be entered into to have it made available for quarantine purposes.

The lack of other suitable sites, however, makes it desirable that every possible effort should be made to have the whole area transferred to the Ministry of Health and reserved as a site for a quarantine station. The arrangement of the station needs some consideration, as certain fundamental factors have an influence on it.

These are:

(1) A decision as to whether the station is to be reserved entirely for quarantine purposes;

(2) Information as to the type and number of passengers likely to be detained;

(3) Consideration of the diseases for which vessels and passengers are likely to be detained.

(1) In regard to the first factor, it is important to know in advance whether it is intended to use the quarantine hospital to meet the needs of the shore population.

Theoretically, a quarantine hospital should be reserved for the needs of persons from infected or suspected vessels. But, as experience has shown that quarantine hospitals are for the greater part of the time unoccupied, it may be legitimate to use them for the shore population, if there is a shortage of shore hospital accommodation.

The population of Woosung has been estimated at 9,000, while the surrounding districts contain about 30,000 people. An infectious diseases hospital at the quarantine station would do something to meet the hospital needs of this area, where at present no facilities exist for the treatment of cases of infectious disease.

(2) We may take it that the deck passengers will form the class of people for whom detention will be required, and that provision should be made for from 300 to 400 people.

These are people who could not be kept under surveillance if released from an infected or suspected vessel. At the present time, if detention were a necessity, they must be kept on the vessel itself.

(3) The diseases to be kept in mind are cholera in the warmer months and smallpox in the colder months.

In addition, cerebro-spinal meningitis cannot be disregarded, while plague and typhus are possible dangers.

Conclusions. — It would, therefore, be desirable to plan a station to meet the isolation hospital needs of Woosung as well as of infected vessels, and to so arrange the plan that active quarantine will not disturb the running of the hospital.

Of necessity, to keep a hospital running continuously will mean additional staff and increased maintenance charges as compared with a purely quarantine hospital for which a staff is obtained when necessity arises, but which, in the interval, requires no trained personnel.

In the outline to be given, the arrangement is such as would be suitable and possible on the reclaimed area owned by the Conservancy Board at the mouth of the Whangpoo, and which cannot be too strongly recommended as the one area inspected which can be adapted to meet the needs of the port.

The following guiding principles may be enunciated:

(1) The isolation area should be completely separated from the remaining buildings. This is especially important if it is to be used for shore purposes.

(2) The examination, bathing, disinfecting and luggage store-rooms should be placed immediately adjoining the shore and the jetty.

(3) The administrative buildings should be so placed as to be convenient of access and in such a position that store-rooms, staff buildings, etc., may be kept constantly under review.

(4) The detention blocks should provide for separation of classes and sexes and be so spaced that they can, if necessary, be isolated from one another.

(5) A look-out should be provided from which the whole station can be kept clearly in view. This might be placed at the quarters of the senior medical officer.

Provision would need to be made for:

(1) A landing jetty or pontoon along which a launch could moor and discharge passengers, baggage and perhaps stretcher cases.

(2) An examination room at the end of the jetty with waiting room for passengers and lavatory accommodation; also a small office and dispensary for needs of detained contacts.

(3) A disinfecting compound, which would include:

(*a*) Store-rooms for luggage awaiting disinfection;
(*b*) Steam disinfecting chamber and machinery;
(*c*) Apparatus or room for formalin disinfection;
(*d*) Store-rooms for luggage after disinfection.

(4) A bath block containing approximately forty showers, with provision for hot and cold water.

(5) A laundry, preferably provided with power.

(6) A power and boiler house, with necessary repair shop.

(7) Detention area:

(*a*) To accommodate 300 to 400 deck passengers in dormitory type of buildings;

(*b*) Accommodation for ten to twelve first- and second-class passengers in single and double-bedrooms with necessary latrine and bathing arrangements and provision for cooking and eating food.

(8) Administrative section comprising:

Office accommodation;
Telephone room:
Quarters for medical officers;
Quarters for nursing staff;
Dining-room for staff;
Kitchen:
Store-rooms;
Quarters for general staff.

(9) Residence for senior medical officer.

(10) Hospital section comprising:

Hospital of thirty beds;
Observation block near the entrance to the isolation area;
Changing block on boundary of isolation area;
Mortuary and laboratory on boundary to serve both hospital and detention sections.

(11) Crematorium.

(12) Tramway and trucks for conveyance of baggage.

Disinfecting Block.

A standard disinfecting block could comprise a building 92 feet long and 44 feet 6 inches wide. This is separated into two parts by a transverse partition wall, which is intersected by the disinfectors. For a large station such as Shanghai, each disinfector could consist of two 9-foot units. Each of these has an inside measurement of 6 feet 6 inches by 4 feet 6 inches and a capacity of about 520 cubic feet. Approximately 620 blankets at one time can be disinfected. The steam for the disinfectors is brought from the main boiler, and delivered at a pressure of 80 to 100 lb. to the steam distributing box. The working pressure in the chamber is 10 lb. to the square inch, and a vacuum attachment provided which gives a vacuum of 20 to 25 inches of mercury. Attachments for formaldehyde gas and for hydrocyanic gas may be fitted.

Standard Bathing Block.

This type of bathing block is entirely different from those seen in other stations visited in the Far East, where either a large concrete bath capable of holding about thirty persons or a group of showers playing on a space capable of holding about this number of persons is the usual provision. Such a form may be regarded as an alternative if the question of individual privacy is not necessary.

A standard bathing block could consist of a building 52 feet 6 inches long and 35 feet wide. This is capable of containing two separate blocks, each of which consists of thirteen shower units. Each shower unit consists of the usual three cubicles — one for undressing, the central one containing the shower and the third for dressing. An exit corridor leads from the dressing cubicles to the outer doorway. Separate sanitary accommodation is provided for each group of thirteen units. Hot and cold water is laid on to each shower, hot water being obtained from a tank room above where it is heated by a calorifier operated by steam supplied from the main boiler at the power-house. From the calorifier the hot water enters a hot storage tank controlled at a constant predetermined temperature by an automatic regulating apparatus.

Laundry.

Seeing that it is proposed to have a hospital in working order a power laundry is indicated. The block would comprise two rooms in one of which washing was carried out while the other was reserved for drying and ironing.

Detention Block.

The detention block is required almost entirely for deck passengers, but there may be need to detain passengers of other classes — *e.g.*, persons refusing vaccination against smallpox and in consequence some small provision in the shape of a few single and double bedrooms should be made. The building containing these should have a small recreation room, together with a kitchen and adequate bathing and sanitary facilities. A room 16 feet by 10 feet conveniently allows two full-sized single beds with essential furniture to be conveniently arranged.

For other passengers, the dormitory type of building with accommodation for from twenty to forty persons is suitable. It is necessary, however, to have these dormitories at a reasonable distance from each other, so that each may be isolated from the remainder and to have in each a small annex which would accommodate one or two persons for very temporary observational purposes.

Sanitary and lavatory provision for each block is also required and is better placed in a separate building.

Hospital Section.

The hospital section is important, and, if intended to house shore cases, would need to be placed at a spot accessible to the outside and yet isolated from the remainder of the station.

It would, of course, provide for the hospital needs of persons from infected vessels and should contain about thirty beds.

Observation Block. — Between the isolation area and the rest of the station, but separated from both, an observation block, constructed so as to accommodate about six patients in three separate rooms, should be provided. This block may need its own kitchen depending on the arrangement of the site, and should have its own sanitary and lavatory accommodation.

Laboratory and Mortuary. — A suitable building near both the isolation hospital and the observation block could house both the laboratory and the mortuary.

Changing Block. — The changing block is on the usual three-room principle of undressing room, bath room, dressing room. This should be placed in the dividing area between the isolation and the open areas of the station.

Nurses. — Sleeping provision for the nurses would be provided outside the isolation area, and the kitchen would also be separate and outside the isolation area.

Expenditure.

An estimate of the expenditure involved in building a station of the type visualised can only be approximate. The first cost is the site itself, unless an arrangement can be made for its transfer. It is particularly emphasised, however, that the value of the site in question consists mainly in its being bounded on two sides by water and, in consequence, any suggestion that a portion of it either without water frontage or with access only to the river Whangpoo should be made available could not be recommended. Such a proposal would have only one real advantage over the existing station, viz. access from the river, and this would not, in my opinion, be sufficient reason to warrant the expenditure contemplated. Another matter to which special attention is drawn is the need for sufficient land. The whole site under review is not too much; but, if it were absolutely impossible to obtain a portion of the area only, an area bounded by the Whangpoo river on the one side and the Yang-tze river on the other is the only site that would, in my opinion, be suitable, and then only if the area available were not less than 100 mow.

Plans.

On the basis of these suggestions, a tentative plan has been prepared showing the layout of a quarantine station on the proposed site. The estimated cost of this establishment is $340,000.

(b) **Amoy.**

Amoy is one of the oldest treaty ports in China, being opened to trade in 1842. It is situated in latitude 24° N., longitude 118° E., on the south-west coast of Fukien Province, opposite the Island of Taiwan (Formosa).

Amoy consists of two parts — Amoy city, located on the Island of Amoy, and the international concession, situated on the Island of Kulangsu.

A space of about half a mile separates these islands from one another, and both are near the mainland (about three miles distant) at the mouth of the river Liong-koe. The port is situated 636 miles south of Shanghai and 293 miles north of Hong-Kong.

Climate.

The climate is warm. Summer begins in May and ends in October, while in February, which is the coldest month, snow and ice are rare.

Amoy Island.

The Island of Amoy, which has a circumference of about thirty-five miles, contains, besides the city, a number of large villages.

Kulangsu Island.

This is about three miles in circumference and contains the hospitals, churches and schools built among luxuriant groves.

Population.

Estimates vary, but the Island of Amoy probably contains from 150,000 to 180,000 persons and the Island of Kulangsu about 33,000. The foreign population of Kulangsu numbers about 250 persons.

Health.

In Kulangsu, there is a hospital (Hope and Wilhelmina), with 150 beds, run by an American Mission. There is also a private hospital with fifty beds and a Japanese hospital.

In Amoy, there is a branch of the Hope and Wilhelmina Hospital containing forty beds, mainly for midwifery patients.

An endeavour is being made, however, to raise funds to construct a hospital in Amoy.

In 1930, there had been no reported case of smallpox or cholera up to June, but there was still time for cholera to appear. Absence of reported cases does not necessarily mean that they have not occurred.

Smallpox may be regarded as endemic. Plague has not been recognised in the city of Amoy, but is endemic on the mainland.

Cases were occurring at Shibee on the mainland at the time Amoy was visited, and there are other endemic centres further inland.

There is a considerable river traffic with the mainland towns, and also a railway running eighteen miles in the direction of Changchow, along which plague infection appears to have spread.

Cerebro-spinal meningitis does not appear to have been epidemic, only one recognised case having been reported in 1930.

Typhoid and dysentery (both amœbic and bacillary) are very prevalent, while tuberculosis and leprosy are commonly met with.

Water Supply.

There is a public water supply for Amoy city, owned by a company. The catchment area is in the hills about five miles away and is leased by the company. There is no habitation at all on this area. The capacity of the upper reservoir is 350,000,000 gallons, and the demand, 500,000 gallons per day. The water is piped to a slow sand filter, and here an ozone plant is available. Up to the present, however, bacteriological tests have shown the water to be so satisfactory that ozonisation has not been necessary. The Island of Kulangsu is still dependent on well water; but, by the end of 1930, water from the public supply in Amoy will be available.

Public Health Administration.

There is a sanitary bureau, but this is concerned only with street cleaning. The quarantine work is under the control of the Maritime Customs. A foreign port health officer has been appointed on a part-time basis, and, by arrangement with another foreign practitioner, the latter carries out all the actual quarantine duties that are performed.

Amoy Harbour.

The port is protected by a double line of natural breakwaters. There is a channel of from 600 to 700 yards in breadth between the islands of Amoy and Kulangsu which forms a convenient anchorage for steamers. Here there is a depth of 14 to 16 feet.

There is no wharfage accommodation.

About twenty vessels from 200 to 500 feet in length can be accommodated. There is also an outer harbour between Amoy Island and the mainland, where a depth of water up to 93 feet is reached.

The quarantine anchorage is situated *below* the inner harbour anchorage limit.

Water for Boats.

This may be obtained from the Waterworks Company, which owns two water-barges and one tow-boat.

The capacity of the barges is 150 tons and 100 tons respectively, and the delivery rate 40 tons per hour.

Vessels entering the Port.

During 1929, the number of foreign vessels from foreign ports entering Amoy were 483; Chinese vessels from foreign ports, 1,929; Foreign coasting vessels, 1,082 and Chinese coasting vessels, 2,528.

The principal imports are piece-goods, ammonium sulphate, petroleum, bean cake and, in some years, rice and sugar.

The main goods exported are canned foods, tea, tobacco and hemp.

Quarantine Procedure.

The only vessels which are required to submit to medical inspection on arrival are those which come from ports declared to be infected.

Infected Ports.

The regulations prescribe that a port shall be declared infected for quarantine purposes when plague, cholera, typhus fever, yellow fever, cerebro-spinal meningitis, smallpox or scarlet fever are known to be epidemic there. A disease is regarded as epidemic so long as, after the first report of its occurrence, any weekly reports thereafter show the occurrence of an average daily number of three new cases.

The machinery which is set in motion to declare a port infected is as follows: The port health officer, basing his decision on information received from the Far-Eastern Bureau at Singapore and from Hong-Kong and Shanghai, officially informs the Commissioner of Customs when he considers a port should be declared infected. The Commissioner advises the Superintendent of Customs, on whom, in consultation with the Board of Treaty Power Consuls, the decision rests. If agreed to, a harbour notification is issued and the Commissioner of Customs or other authority at the port in question is informed of the decision. The withdrawal of such declaration is carried out in the same way.

At the time Amoy was visited (June 7th, 1930), no ports were on the list of declared ports; but consideration was being given to the question of declaring Saigon infected with cholera.

Two declarations had, however, recently been withdrawn — viz., a declaration that Hong-Kong was infected with smallpox and a declaration that Shanghai was infected with cerebro-spinal meningitis.

Medical Inspection.

During the time these two ports were so declared an average of ten vessels per week from Shanghai were medically inspected.

Notification.

The impending arrival of vessels is notified by the Customs, but this is incomplete and is supplemented by direct enquiry from the shipping companies' agents.

Procedure.

The medical officer, using his own launch, boarded each vessel on arrival and carried out an inspection of the crew and passengers.

Fee.

A minimum fee of $15 (Amoy) is paid for the inspection; but, should the number of persons on board exceed 199, an additional $10 for each hundred persons or portion thereof is charged.

Vessels are inspected also if they have a dead person on board, whatever their ports of departure and call.

In such a case, the procedure varies with the circumstances.

If a qualified surgeon is on board, a certificate is given after due enquiry, but otherwise the body is seen and a certificate issued to the harbour master indicating whether the death is regarded as due to an infectious disease. If the death is regarded as indicating a suspicion of a quarantinable disease, a full inspection is carried out.

Deaths while a Vessel is in Port.

Vessels on which a death takes place during their stay in port hoist the flag " G ", which indicates that a doctor is required.

Pneumonic Plague.

Regulation 6 shows the importance attached to pneumonic plague, for it prescribes that " vessels from a port infected with pneumonic plague will not be admitted to pratique until seven clear days have elapsed since their departure from such plague-infected port ".

The regulations prescribe a number of things that are honoured more in the breach than in the observance — e.g., Regulation 3 reads: " No person shall be allowed to go *on board* or leave an infected or suspected or healthy vessel without the sanction of the port health officer, nor shall such vessel be allowed to discharge or take on cargo, baggage, etc., without such sanction ".

Information was given me that what happens is that, as soon as a ship arrives at the quarantine anchorage, the boarding-house runners go aboard and have actively interfered with the procedure of medical inspection by inciting passengers not to present themselves for examination.

An attempt to improve matters by prosecution has had no deterrent effect, and this state of affairs is a serious indictment against the authority responsible for the enforcement of the regulations.

Quarantine Signal and Hours of Boarding.

The quarantine signal is the "Q" flag, hoisted at the fore-mast, and vessels are inspected between the hours of six a.m. and six p.m.

Fumigation.

Although certain lines make Amoy their final port in China, there is no fumigation carried out at the port; but the method which would be adopted in the case of an infected vessel was stated to be sulphur fumigation, using the pot method. Lighters are registered with the harbour-master and number 312, but no fumigation requirements exist.

Outward Bills of Health.

A bill of health is issued on the application of the shipping companies in respect of vessels proceeding to Singapore. This is chiefly required to indicate the number of passengers embarking and to record the fact that they have been inspected.

Action taken in Regard to Infected Vessels.

Considerable difficulty has been experienced in dealing with infected vessels, because there is neither an isolation hospital for patients nor anywhere to observe contacts other than on board the vessels.

The procedure followed has therefore varied according to the circumstances. An infected vessel may be ordered to proceed to Hong-Kong, 293 miles away, or a patient may be landed on to one of the islands in the harbour, and the remainder of the passengers detained on the vessel for observation, or, in case of smallpox, vaccinated and released.

There is no possibility whatever of surveillance once passengers have left the vessel, as the type of deck passenger who returns in considerable numbers may live long distances from Amoy in the mainland, and cannot be kept in the city unless strictly controlled.

The extent to which infected vessels may arrive is, of course, quite uncertain. In the five months during which Hong-Kong and Shanghai have been infected, no cases of infectious diseases have been seen.

But an infected vessel is a possibility at any time, and, inasmuch as 1,000 deck passengers may be carried at a time on vessels from southern ports, consideration as to what provision should be made to meet an emergency is necessary.

Measures in Port.

So far as vessels are concerned, there is no supervision while in port, and nothing is attempted in the way of precautionary measures against rats on shore.

Emigration.

There is a large emigration traffic from Amoy. This traffic is organised and financed by brokers, whose agents apparently include some of the boarding-house keepers of Amoy. The traffic continues throughout the year, the peak being reached in March, with a smaller peak in September. The slackest period is in July. The emigrants come from the surrounding districts on the mainland as well as from the Island of Amoy itself. They usually arrive only a short period before the sailing date, and, during the interval, live in boarding-houses in Amoy. Their destinations are, broadly, three — viz., (1) Philippine Islands, (2) Java, (3) Straits Settlements and Rangoon.

The members vary considerably, and show a decrease of recent years. For, whereas the total figure in 1926 was in the neighbourhood of 200,000 persons, in 1928 it reached a total of 93,545 persons, and, in 1929, the figure was 101,898.

Of the total who emigrated in 1929, the destination was Manila or Java in the case of 12,594 persons, and the Straits Settlements and Rangoon in the case of 75,007 men and 14,247 women and children. The type of emigrant varies considerably. Many are young men under 30 years; but quite a number are older, and some of these are going to join relatives.

Prior to departure, a medical inspection of all emigrants is made on board the vessel.

This is the usual line inspection for the detection of gross lesions, and results in the rejection or deferment of perhaps 1 to 2 per cent of the number inspected. The conditions causing rejection are mainly tuberculosis, leprosy and, perhaps, severe trachoma and skin lesions. Where a condition is curable, deferment for the time necessary to effect this is practised.

Emigrants' Home.

There is an emigrants' home under the supervision of the British Consul, with accommodation for about thirty general and two infectious cases. Here, deferred cases may remain, although there is no medical staff to give treatment.

This home is maintained (1) by a contribution of one cent per head for each emigrant to Singapore made by the shipping companies, and (2) by voluntary subscriptions.

Neither the authorities at Singapore nor those in Java actually insist that emigrants should be medically inspected before departure. On arrival, however, at Singapore, all deck passengers are inspected, and, if scars of recent vaccination or of smallpox are not found, vaccination is performed. Deck passengers arriving in Java are not required to be vaccinated, though it has been remarked that many have ulcerated arms as a result of recent vaccination.

Fees.

The fees for vaccination are paid by the shipping companies at the rate of 30 cents per head.

Emigrants to Manila.

These come under the regulations of the United States of America, which require them, on arrival, to produce a card bearing their photograph on which is recorded the date and result of vaccination performed against smallpox prior to leaving their port of departure.

Fees.

For the vaccination and subsequent inspections a fee of $1 (Mexican) is charged if the operation is performed during definite hours. If special times and attention are required, the usual consulting fee, $5 (Mexican), is charged.

Special Precautions in Regard to Cerebro-spinal Meningitis.

For a period during 1929, all migration to Manila was stopped on account of cerebro-spinal meningitis. To meet this emergency, arrangements were made for emigrants to be kept under observation for fourteen days before departure. During this time, temperatures were taken and swabbings from the naso-pharynx examined.

Later, it was deemed sufficient to see the emigrants at the beginning and end of the fourteen-day period, on each of which occasions the temperature was taken. During the interval, they remain in Amoy city, where no cases of the disease have been recorded.

Summary and Conclusions.

No public health work is being carried out in Amoy. Although there is a port health officer responsible to the Commissioner of Customs for certain quarantine duties, they are not performed by him. Fortunately, the officers who actually carry out the duties are keen, experienced men who perform their duties well and conscientiously, so far as this is possible. But there is no direction at all of these efforts, and no support or backing to ensure their performance is made as efficient as a firm administration of the regulations would allow.

The service lacks the direction it would obtain by transfer to and direct control by a central service administered by a technical officer. In other words, as soon as the National Quarantine Service has the personnel, it should take over from the Maritime Customs the entire responsibility for the port health work of Amoy. This becomes all the more pressing and important because of the large emigration and immigration traffic. The supervision and control of this traffic is a function for the Ministry of Health, which should be the authority responsible both for the examination of emigrants before departure and for the issue of the necessary certificate. It is recommended that the Government should, as soon as it is prepared to take over control of the health services of the port, endeavour to come to an arrangement with the countries through which emigrants pass and which receive them concerning the conditions which should govern the medical examination, prophylactic measures and the issue of certificates.

Recommendations.

Organisation. — The control of the port health work should be in the hands of the National Quarantine Service, so soon as this service is in a position to accept the responsibility.

In the first place, two experienced full-time quarantine (medical) officers should be appointed, who would carry out, not only the examination of incoming vessels, but also the examination of emigrants prior to departure.

In order that this examination should be efficiently performed, the emigrants would have to arrive in Amoy some days prior to the proposed sailing date.

During this waiting interval, they would need to be housed and kept under surveillance.

Two methods of doing this suggest themselves:

(1) To allow them to live in boarding-houses as at present;

(2) To detain them at a quarantine station.

(1) The first method would only be satisfactory if the premises were approved by the quarantine service. This would necessitate an arrangement being come to with the proprietors in regard to accommodation and supervision. Seeing that these proprietors are financially interested in the traffic, it should be possible to agree on conditions that would enable the emigrants to be housed and kept under surveillance. The shipping companies are also interested, as rejected emigrants are a source of expense to them, and it seems possible that they might be a party to any such arrangement.

(2) To detain emigrants at a quarantine station would enable the observation of them to be carried out to better advantage, and also permit curable defects to be treated and any necessary disinfection or disinsectisation to be performed. Such a method, however, involves the construction of a quarantine station with expenditure of money in buildings and equipment and subsequently in maintenance.

If emigrants were to be housed at a station, the cost of their maintenance should be recouped to the Government. This should not, however, be difficult to arrange. If we assume that the emigrants are not in a position to pay for their maintenance at a quarantine station, we are entitled to go a little further and assume that neither will they be able to pay for their maintenance at a boarding-house. In other words, if the emigrants have to be financed, then the whole question resolves itself simply into a matter of arrangement with the financiers, so that the cost of maintenance is paid by them and recovered in due course from the emigrant. It is needless to add that the Government might think it desirable, not only to become responsible for the medical examination of emigrants, but also to know in detail the conditions under which the traffic takes place, including the arrangements made to finance the emigrants.

So far as the requirements of the port are concerned, it would be necessary to provide the quarantine officers with a boarding-launch and crew. This would be a motor-boat and two men.

An office would be required, and could probably be obtained in the city without difficulty.

There remain to be provided facilities for laboratory examinations, which might be arranged through the university authorities.

Quarantine Station. — The desirability of building a quarantine station is a matter which requires careful consideration.

The two outstanding factors are: (1) a large emigration traffic amounting to about 100,000 persons per annum; (2) an immigration traffic amounting to about 50,000 per annum.

The latter makes it possible that a vessel infected with smallpox, cholera, plague or cerebro-spinal meningitis may require to be dealt with at any time. Such a vessel may carry up to 1,000 deck passengers. It does not seem possible to handle such a vessel efficiently without the facilities afforded by a modern quarantine station. The question of surveillance of deck passengers can be dismissed at once as impracticable. They must either be detained on shore or on ship or released, or alternatively the ship sent on to another port suitably equipped. Detention on shore necessitates a quarantine station. Detention on the ship is unsatisfactory, as overcrowding produces the most suitable conditions for spread of infection, besides being an unfair burden on the shipping company. Release is attended with considerable risk and cannot be recommended — for example, where cholera or cerebro-spinal meningitis were being dealt with. There still remains the possibility of sending the ship to a port which is properly equipped to receive it. This is probably the solution to be recommended were it not for the importance and size of the emigration traffic. Because of the latter, however, and of the advantage it affords of keeping emigrants under observation before departure, it is recommended that, if financial difficulties can be overcome, a quarantine station be constructed at Amoy.

Site. — Several islands nearby were considered to be possible sites, but each has the disadvantage of difficult access, lack of water, lack of fuel, etc., which makes it difficult to run them easily. There is, however, no reason to doubt that a suitable site could be found on Amoy Island itself, where water, lighting and transport are available.

Such a station, if established reasonably near the quarantine anchorage, could form the headquarters of the whole staff of the organisation. Provision would be required for not less than 500 persons, and sufficient land would be required also for temporary extensions. The buildings would include a small laboratory with facilities for conducting examination of specimens. Landing jetty, power, disinfecting and bath blocks, hospital, suspect wards, detention blocks, mortuary and staff quarters would be required. Here, also, the possibility of the hospital admitting shore cases seems to offer considerable advantages.

Deratisation. — Certain shipping lines make Amoy their final port, and, in consequence, the necessity for deratisation occurs. To meet this, the quarantine officer should have the assistance of a competent officer, who would direct fumigation operations and supervise them. For the time being, sulphur fumigation, using pots, would suffice to meet the needs of the situation. At the same time, the fumigating officer would be a trained rat-searcher and may need to have a trained assistant. Were a quarantine station established, both these officers would, when not otherwise engaged, carry out duties at the station. A suitable procedure would be for the fumigating officer or his assistant to board incoming vessels with the medical officer and to commence his survey at once.

The fumigating officer would be responsible for keeping under supervision vessels in port so far as their sanitary condition was concerned. He would also know by frequent visits the type and condition of the cargo carried and whether it was rat-infested.

The staff of the port to commence would thus comprise: two quarantine (medical) officers, one fumigating officer and perhaps an assistant and launch crew of two men. This staff would be increased, if necessary, to meet the conditions existing, and the direction in which an increase would probably be first required would be on the medical staff.

There is very much need for some public health work to be carried out in the city of Amoy itself.

It seems certain that the establishment of a modern quarantine service would lead, in a short time, to a demand for a public health service for the city. This could be encouraged by the appointment of an additional quarantine officer, trained in public health methods, whose services were available in the service of the shore authority. In this way, a much-needed co-ordination of shore and port health work could probably be obtained.

(c) **Canton.**

This city lies about 80 miles above the entrance of the Chu-kiang or Pearl river. It is the centre of a network of waterways having the Pei-kiang on the north, the Tung-kiang on the east and the Si-kiang on the west. It is situated in latitude 23° 7′10″ N., longitude 113° 14′ 30″ E., and thus lies just within the tropics. From Hong-Kong, the journey may be made by river boat in six to eight hours or by train in about four hours. In addition, a large number of launches, junks and other vessels ply between these two ports and between Canton and Macao.

As regards the introduction and dissemination of infectious disease, Canton and Hong-Kong may be regarded as one port, seeing that 4,000 to 5,000 persons travel to and fro each day.

The city proper is about six miles in circumference and the whole circuit, including the suburbs, is about ten miles.

Population.

The latest official census records the population as being 1,367,680. The boat population on the Chu-kiang is variously estimated at 55,000 to 120,000. This latter population belongs to a class which lives its entire life on boats in the rivers and creeks.

The population of Shameen — a small island embracing 44 acres — is 2,414. Of this number, approximately 800 are foreigners and 1,600 Chinese.

Canton is a centre of the silk trade.

The number of vessels entering and cleared in 1929 was 8,330, with a tonnage of 7,630,109; but, of these, a large number were river steamers trading with Hong-Kong and Macao. The junk traffic reaches very large dimensions, the number entering and cleared being, in 1927, no less than 7,587.

The Chu-kiang has two bars, where the depth varies from 8 feet at low water to 15 feet at high water.

This renders it impossible for many vessels to enter the river until partly unloaded. For this purpose, they lie at Whampoa, where there is 20 feet of water and there lighter portion of their cargo.

The wharves are privately owned and have accommodation for four river steamers, and seven ocean steamers. In addition, there are buoys for seven river steamers and anchorages for twenty-three ocean steamers. The port of Canton can accommodate forty-one vessels up to 350 feet in length.

At Whampoa, there are anchorages for twelve ocean-going steamers — up to 500 feet in length (*Year-Book*, 1930).

Lighters are registered with the authorities and number about 1,200.

The administration of the city of Canton is at present under the control of the mayor, who is responsible to the Central Government in Nanking. It has been reported that a change is to be made, and that the city will come under the jurisdiction of the Provincial Government of Kwantung.

Health of Canton.

There are reasons to regard Canton as the starting-point of the plague epidemic of 1894. For the past four years no cases of plague have been reported from Canton, and none appear to have been recognised. On the other hand, no active steps have been taken to eradicate the disease, although it is suggested that a campaign against rats commenced several years ago is still producing results.

Smallpox is endemic and cholera occurs, but typhus has not been recognised.

Typhoid fever is very prevalent, some cases being present all the year round. Dysenteries are very common. Cerebro-spinal meningitis has not been recognised bacteriologically, although many cases are diagnosed; and restrictions imposed by Manila against the disease necessitate persons spending fourteen days in Hong-Kong before proceeding there.

Diphtheria occurs, but not scarlet fever. Pneumonia, on the other hand, is increasing in numbers. Of respiratory diseases, however, the most important by far is tuberculosis, which is very prevalent.

Water Supply.

There has been a public water supply since 1908. This is stated to have been actually the first public supply of water in China. The intake is from the river, and the water is passed through slow sand filters and chlorinated. The supply, however, is insufficient, and during certain hours of the day none is available.

Quarantine Administration and Procedure.

The public health service is under the control of the Commissioner of Public Health of the Canton Municipal Government. This service has three divisions: (*a*) epidemic, (*b*) public health, (*c*) hospital.

Under the former is the quarantine service, which consists of two boarding-stations — one at Nam Shek Tau and the other at Whampoa.

Staff. — At each station there is a part-time medical officer on duty during the boarding hours. There is also a boarding staff and launch crew.

Floating Plant. — Two motor-boats are available at each boarding-station, each manned by two men.

Procedure. — Vessels requiring inspection anchor at the quarantine anchorage, and are there boarded by the doctor and three lay assistant officers. The regulations prescribe that "all ships entering the port of Canton must be inspected by the health officers ".

In practice, however, inspection of ships from Wuchow, a river port on the Sikiang, 225 miles from Canton, 330 from Hong-Kong and 300 from Macao, is not enforced.

In 1929, 1,433 vessels were inspected, including ocean-going vessels which had touched at Hong-Kong as well as vessels which had traded along the Chinese coast.

Passengers. — The average number of persons per vessel was thirty-seven, which means, in effect, that passenger traffic to Canton is not supervised by the quarantine service, while the crew of ocean-going vessels are inspected. This has an important bearing on the equipment and organisation of the port.

Medical Inspection.

The actual routine is to muster all persons for inspection by the quarantine officer and for this officer to also inspect the passenger and crew accommodation. The master is required to give particulars of the ports called at of any cases of sickness, deaths or births on the voyage and of the nature of the cargo carried.

In the case of any sick persons or suspects, arrangements are made for their admission to the Municipal infectious diseases hospital. Admission is said to be somewhat difficult to arrange, and there is reason to doubt whether, at the present stage, this hospital really is entirely suitable for the isolation of ship-borne infections. It is stated that there are beds for thirty infectious cases at another hospital in the city, but the facts are somewhat difficult to obtain. There is no provision for detention of contacts ashore; if necessary, they may be detained on the ship, otherwise they are released under surveillance.

Quarantinable Diseases.

These are cholera, smallpox, plague, typhus fever, yellow fever and any other epidemic diseases which the health officer may consider to imperil the safety of the port. It is to be noted that this list may be increased at the discretion of the health officer.

If smallpox has occurred on a vessel within twelve days of arrival, or if cholera, plague, yellow fever or typhus have occurred within the previous seven days, a ship is regarded as infected.

A suspected ship is one on which a quarantinable disease has occurred, but on which there has been no new case of smallpox within the twelve days previous to arrival, nor of plague, cholera, typhus or yellow fever within the seven days preceding arrival.

Infected Ships.

Infected ships are kept in quarantine for ten days in the case of smallpox, five days in the case of cholera and plague, and six days in the case of yellow fever and typhus fever.

Suspected Cases.

Where a person is suspected of having a quarantinable (infectious) disease, a period of two days is prescribed during which the diagnosis may be made; but, if at the end of this time the suspicion has not been cleared up, the ship on which he arrived is regarded as infected.

Suspected Ships.

A suspected ship may be treated just as an infected ship.

Non-infected Ships.

A non-infected ship is granted free pratique; but, if coming from an infected port, may be held for observation, and all instructions given by the quarantine officer must be carried out.

Ships in Harbour.

If a case of infectious disease develops on a ship in the port, the above regulations equally apply. In addition, when any case of sickness occurs on a vessel without a surgeon, the "Q" flag must be hoisted at the foremast and the quarantine officer sent for to determine its nature. There is, however, no routine inspection or supervision of the health of the crews of vessels in port. Quarantine anchorages are prescribed and are just outside the port limit.

Infected Ports.

Information regarding the state of ports is obtained from the Singapore Bureau and from Shanghai and Hong-Kong. A port having an average daily number of three or more cases of any of the prescribed quarantinable diseases is declared an infected port.

Laboratory Examinations.

Specimens are sent to the municipal laboratory for examination.

Exportation of Disease.

There are no precautions taken against the exportation ot disease by passengers or cargo.

Deratisation.

There is a requirement that ships shall be fumigated every six months. In 1929, six vessels were fumigated when empty by the health guard. Sulphur in pots was used, but the results were not recorded. The charge made was 10 cents per ton and a certificate was issued. Information was given that a Clayton fumigating apparatus had been ordered.

Finance.

All the quarantine (medical) officers are engaged in private practice. They spend alternate days at the boarding-station and in their practice. They are paid approximately £10 per month, which is insufficient to keep them.

Comments.

As the control of the quarantine service is in the hands of the department which is responsible for the public health activities of the city, there is a uniformity of administration which makes complete co-ordination between the various divisions of the department easily possible.

This is important, as it places at the disposal of the quarantine service such facilities as laboratory diagnosis, hospital beds, personnel for disinfection work, information regarding measures for destruction of rodents on the waterfront and in the port, and the possibility of utilising the shore organisation or surveillance of contacts, for supervising the health of the port workers and for controlling the exportation of disease. The value of such a form of control, however, depends entirely on the completeness of the shore organisation, the efficiency of its administration and the support it receives financially and morally from the municipality. The arrangement, too, might be a disadvantage if the quarantine division received a disproportionately small share of the budget of the department. There is a general feeling that the quarantine service would gain by transfer of control from the municipality to the National Service. This is not such a radical change as might appear, because the Ministry of Health has a direct responsibility for health administration of each special municipality, and Canton comes within this category.

The reasons for suggesting this change were:

(*a*) That insufficient money was being made available to run the service efficiently. This meant low pay for staff and complete absence of equipment other than boarding launches;

(*b*) That there was a lack of co-ordination between shore and port health work;

(*c*) That no facilities existed for the observation of patients or contacts from an infected ship.

An analysis of these reasons does not indicate that the principle of local municipal administration is faulty, but does suggest that complete responsibility for the service should not be left in the hands of the municipality.

There are at least three methods of providing for the control of the service.

(1) To allow it to remain, as at present, under the complete control of the municipality, which would be responsible to the National Service for the administration of the regulations of that service.

(2) To provide a separate quarantine division in the municipal health department administered by a medical officer, appointed by and responsible to the Central Organisation of the National Quarantine Service. This medical officer could, if the right man were available, be seconded from the staff of the municipal department, so that the value of co-ordinated effort might not be lost.

(3) To transfer the quarantine service completely to the National Service, which would set up its own organisation for the port.

The respective merits of the three proposals may be considered.

(1) The first would appear the most satisfactory, provided the municipal health service were completely reorganised, provided with sufficient funds and trained personnel, and commenced to play a much more active part in the prevention of disease. As there does not seem to be any reason to anticipate such an alteration of policy, this proposal is not favoured.

(2) The second proposal would be rather difficult and could conceivably lead to friction. It is put forward, however, because it is felt that, where a modern municipal health service exists, the quarantine work could well be included.

(3) This leaves the third proposal only, and, in view of the local situation at Canton, it is considered that, at the present time, it is the one which best meets the position. It would provide for uniformity and would enable such an organisation to be set up as the necessities of the port demand. The funds for such a service could be provided from the Maritime Customs Revenue.

The requirements of the service are:

(1) A budget large enough:

(*a*) To enable a trained staff to be appointed on a full-time basis;

(*b*) To provide equipment so that the staff can efficiently carry out medical inspections of vessels, supervision of crews of vessels in port;

(*c*) To provide for a permanent rat-catching and examination service for the port;

(*d*) To make deratisation measures on vessels possible, following inspection of their sanitary condition;

(*e*) Enable provision to be made for the examination and prophylactic treatment of oversea passengers and supervision of cargo when quarantine diseases are present in the port.

(2) Facilities for examination of laboratory specimens by a trained bacteriologist.

(3) Facilities for isolation of patients from infected or suspected vessels.

(4) Facilities for observation of contacts from infected or suspected vessels.

(5) Facilities for treatment for cases of venereal disease among the crew of vessels in port.

(6) The application of the regulation of the service in a uniform manner and co-ordination of the work of the port with that of other ports under the control of the National Service.

The requirements set out under headings numbered 2, 3, 4 and 5 could be provided by arrangement with the municipal health department and the appropriate shore institutions. This would obviate the necessity for any large capital expenditure.

The River traffic to Hong-Kong and Macao.

The question of whether this traffic should be supervised by the quarantine service is a matter for consideration.

In effect, the position is that the greater part of the passenger traffic and a definite proportion of the cargo traffic entering Canton is at present transported on vessels which are not subjected to quarantine inspection.

The distance between Canton and Hong-Kong and Macao is so short that, from the point of view of development of disease, they may be regarded as part of the one city.

In the case, therefore, of persons coming from Hong-Kong only, and not from ports beyond, and examination seems beyond the necessities of the situation; and, if made, would carry with it the obligation to examine train and junk passengers.

Overseas Passengers arriving by River Boat.

From the point of view of inspection, Hong-Kong and Canton may be regarded as one port. Where passengers come from ports beyond Hong-Kong and tranship to river boats, an examination may be indicated if the ports of departure and call were infected. If, however, an arrangement were possible with Hong-Kong by which the examination were carried out on arrival there, and before transhipment to the river boats, a reasonable degree of safety would be obtained.

Ocean-going Vessels.

This raises, of course, the question of the necessity of examining ocean-going vessels which have been examined at Hong-Kong. On this point, it seems that a practicable measure would be to examine only boats which have left the last oversea port before Hong-Kong less than the longest quarantine period for the disease to which the regulations governing quarantine in Canton apply — i.e., fourteen days.

In practice this would work as follows: any ocean-going vessel which arrived at Canton and which had been at sea not less than fourteen days since leaving its last oversea port, and which had been medically inspected at Hong-Kong and found free from infection, would not be again inspected on arrival at Canton, and *vice versa.*

If all of these conditions were not complied with, or if there had been a case of infectious disease on board since the examination at Hong-Kong, the vessel would be inspected at Canton.

Traffic would be free and unrestricted between the two ports unless there were some quarantinable disease in the one city that was not present in the other.

(d) **Newchwang.**

Newchwang was formerly situated at the mouth of the Liao river; but, by reason of silting, the coast has been removed ten miles inland, so that the port of Yinkou has been developed in order to do the work previously done at Newchwang.

It is situated fourteen miles from the mouth on the left bank of the Liao and has a population of 107,000, of whom 3,000 are Japanese. The city stretches along the bank of the river for a distance of over a mile and consists of two portions, the New Town and the Old Town. The Old Town is separated into two parts by the Lao-yeh-ko.

The sea trade is at a standstill for three to four months in the year (November to March) when the port is ice-bound.

Harbour.

The depth of the harbour is 6 feet at low water on the bar, but 21 feet in the harbour.

The number of vessels that can be accommodated equals sixty up to 4,500 tons.

Anchorages.

There are two, one for steamers and the other for junks.

Navigability.

The main course of the river is navigable for junks for 500 miles, or 750 miles if tributaries are included.

Trade.

The junk trade is an indispensable factor in bringing the regions along the river into touch with Yinkou. The oil-milling industry is very brisk.

Exports.

The main exports are soya bean, bean oil, bean cake, wheat, millet, sorghum, raw silk and hides, which are carried by junks to Yinkou.

Imports.

The main imports are cotton goods, cigarettes, kerosene, sugar, flour and matches.

Prior to 1907, Newchwang was the only outlet through which the Manchurian trade passed, but since that date Dairen and Antung have come to the fore. Dairen has the great advantage of having a deep harbour open all the year round. This has had its effect on the junk trade, the number of these vessels employed in the river trade now reaching about 4,000, as compared with 20,000 engaged in the trade a quarter of a century ago.

Health of the City.

The city is well supplied with public hospitals, there being the Japanese Hospital, the City Hospital, the Irish Mission Hospital and the Quarantine Hospital conducted by the North Manchurian Plague Prevention Service.

Water is available from a filtered supply, and to this has been ascribed the relative freedom from epidemics of gastro-intestinal disease.

Smallpox and cholera occur; the former, however, is a diminishing factor, owing to the increase in the number of vaccinations performed.

There were thirty-five cases of cholera treated in the Quarantine Hospital in 1926-27 and nine in 1929.

Tuberculosis is, however, very prevalent.

Quarantine Administration and Procedure.

The quarantine work is administered by the Commissioner of Customs, which department provides also the boarding launch.

The port medical officer is a foreign practitioner, who receives a yearly salary from the Customs department.

Infected Ports.

Vessels are inspected when they come from ports declared infected. At the time the port was visited, Shanghai was declared infected with cerebro-spinal meningitis, and all vessels from Shanghai awaited medical inspection.

The number of vessels inspected depend on the ports declared infected, and averaged two a week at the time of the visit.

During the cholera season in 1929, there were examined 136 vessels, carrying more than 10,000 Chinese passengers. The Chinese crews of the vessels alone numbered over 6,000.

Infected Vessels.

During this season, three vessels were detained, each for a period of seven days.

Vessels entering and clearing.

The number of ocean-going steamers entering the port in 1928 amounted to 1,724.

Wharfage.

There is no hindrance to the transfer of rats from ship to shore or *vice-versa*. A number of junks are moored alongside the foreshore itself.

Passenger Traffic.

During 1928, approximately 250,000 Chinese passengers arrived, while nearly 100,000 sailed from the port.

There is a large influx of passengers towards Manchuria from the southern provinces, and the possibility of introduced disease is an ever-present risk.

Quarantine Hospital.

This is financed from the Customs receipts, a cheque being drawn on Customs and paid into the quarantine account. From this, all the costs of maintaining the Quarantine Hospital are met, including staff salaries.

Location.

The hospital is situated about two miles along the river and near the Quarantine anchorage.

It comprises the hospital proper built in the form of a l——l of thirty beds, with operating theatre, sterilising room and nurses' quarters at one end and out-patients' block, laboratory and pharmacy at the other end.

Quarters for resident medical staff are provided on the first floor.

Kitchen and staff quarters are at the rear, completing the fourth side of the square.

The disinfection block and boiler-house contain a Thresh disinfector.

The isolation block is located near the entrance gate, and contains four rooms, each for two beds.

There is also a kitchen attached and a duty room for nurses.

The mortuary comprises two rooms in a separate building.

Unfortunately, the area available is very small, and, in consequence, the buildings are situated close to another without any possibility of providing space for convalescent patients to move about it.

Detention Accommodation.

Four years after the opening of the hospital, one corner of the land was devoted to the building of detention blocks for the observation of contacts from infected or suspected vessels.

Their structure is of ferro-concrete and comprises three rectangular blocks for men and one for women.

The blocks have a central entrance, on either side of which are dormitories with concrete floors. Raised above the floor are two parallel rows of " kongs " — hard wooden boards resting on ferro-concrete supports. The contacts place their mats on these boards. Each row accommodates twenty-five persons, each dormitory fifty, and each building one hundred persons.

In the case of the women's block, the accommodation is capable of housing fifty persons in a similar way.

Latrines.

Each block has a series of six pan-closets in a separate concrete building.

There is also another L-shaped block containing rooms with fires for the use of families.

This block also contains the kitchen for the whole detention compound.

Examination Block.

In 1927, there was added an examination block, which has also at the top a look-out tower to enable a watch to be kept on the compound.

This block comprises a large waiting room, small examination rooms for men and women, boiler room, a group of five showers for men and a similar number for women and dressing rooms. The principle is that the arrivals will be examined and bathed before admission to the detention block.

On the first floor are the resident doctors' quarters.

This quarantine station contains the essential organisation buildings and plant to enable any quarantine emergency to be handled. The disadvantages are:

(1) Location;

(2) Smallness of area.

(1) The station is located in a thickly populated area, being surrounded on two sides by numerous dwellings.

To the north it faces the river, and on the west is a small creek; but, unfortunately, there is no access by water. Patients and contacts from ships would have to be landed at the native Customs jetty and conveyed through narrow streets for a distance of about half a mile to reach the station. These streets are lined with small shops. At the south side is another entrance to the town, beside which is the guard's building.

(2) The area is extremely small, and difficulties might arise from the detention of contacts from a ship infected with, say, cerebro-spinal meningitis.

Doubtless, a most commendable effort has been made to provide accommodation for contacts from infected ships in an area intended for hospital purposes only.

The idea of providing a hospital to meet part of the needs of the community is a good one; but, if it is intended also to meet the emergency requirements of infected and suspected vessels, the whole conception should be planned at the commencement, even if a portion only of the whole scheme can be carried through at the beginning.

Proposals for Reorganisation.

The transfer of the medical inspection work, together with the control of the quarantine station and hospital to the National Quarantine Service would enable a sufficiently complete service to be carried on from the quarantine station as headquarters.

VI. SUMMARY.

The reorganised National Quarantine Service for China would comprise:

1. Central Administration;
2. Local organisations in individual ports.

(1) The Central Administration has already been created in the form of a temporary department, responsible directly to the Minister of Health.

This administration, which commenced to function on July 1st, 1930, under the direction of Dr. Wu Lien Teh, has its headquarters at Shanghai. It has assumed responsibility for the quarantine service of Shanghai, and will be responsible, in time, for the service provided by the Nationalist Government throughout China.

Local Organisations.

Each local service will form part of the National Service, and will be responsible to the Central Administration. It shall apply the necessary measures of quarantine according to the directions received from the central organisation, and shall inform that organisation immediately of:

(*a*) Every quarantine emergency with which it is called upon to deal;

(*b*) The measures taken in regard to vessels which are proceeding to other ports; and regularly regarding,

(*c*) The complete quarantine activities of the port.

Each local organisation would be responsible for

(*a*) Medical inspection under the regulations of vessels on arrival;

(*b*) Supervision of the health of crews of vessels while in port, so far as staff considerations will permit;

(*c*) Sanitary inspection of vessels in port, including a determination of the extent of the rat population;

(*d*) Deratisation within the limits of the equipment provided;

(*e*) Arrangements for treatment of cases of ordinary infectious disease on vessels in port;

(*f*) Arrangements for treatment of cases of venereal disease among the crews of vessels;

(*g*) The application of such measures contained in the regulations as the equipment of the port will permit in dealing with infected or suspected ships;

(*h*) The application of measures against the exportation of disease when the port is infected;

(*i*) Keeping the shore health authorities advised in regard to the presence of and action taken in respect of cases of ordinary infectious disease on ships in port;

(*j*) Carrying out, by arrangement with the Central Organisation, of public health duties in conjunction with or on behalf of the shore health service.

In addition, the organisation of the larger ports will be responsible for such other duties as their equipment entails, including the control of quarantine establishments or emigration depots.

Local Organisation in Individual Ports.

Shanghai.

A. The following organisation, directed by Dr Wu Lien Teh, was set up in order to take over the control of the service on July 1st, 1930:

(*i*) Administrative division, which has one medical assistant and the necessary secretarial staff;

(*ii*) Medical inspection division:
Two medical officers;
Boarding-launch and crew;
Sanitary station and staff.

The foreign medical officer was to resign on July 31st, 1930, and the services of the foreign sergeant who assisted in boarding vessels and controlled the sanitary station has been made available again to the Customs department, from which he had been loaned.

(*iii*) Fumigation division:
One medical officer in charge;
Clerical staff;
Fumigating barge with tow-boat and crew and equipment for using carbon monoxide or sulphur.

The above personnel will require training, which it is proposed to commence with the return of the medical officer, who has been studying quarantine in Europe.

B. Proposals:

1. Administration: To be controlled by the Central Administration, which should have the necessary technical and secretarial assistance in order to administer the following services:

2. Medical Inspection:

(*a*) A permanent service at Woosung with three or four medical officers, assistants and necessary launch facilities.

(*b*) If junk traffic is to be controlled, additional services at Jessfield and Lungwha.

3. Quarantine station with:
Administrative and staff quarters;
Hospital;
Laboratory;
Detention blocks;
Bath and disinfection blocks;
Baggage stores;
Power-house;
Laundry;
Mortuary, crematorium.

4. Sanitary inspection and deratisation division:
    (*a*) Sanitary inspection of vessels;
    (*b*) Examination for conditions of rat infestation;
    (*c*) Deratisation service and issue of certificates;
    (*d*) Service for examination of rats and their fleas.

5. Provision for treatment of cases of venereal disease in the mercantile marine by arrangement with shore authorities.

Newchwang.

The control of the service might be transferred at any time to the Central Organisation of the National Service. This would involve (*a*) the medical inspection service now under the control of the Customs department, and (*b*) the quarantine station now under the control of the North Manchurian Plague Prevention Service.

The double transfer would place the whole organisation under the one control and provide the following service:

1. Medical inspection;

2. Quarantine station, where there are the following:
    Bacteriological laboratory;
    Hospital for general and infectious cases;
    Disinfection bath block;
    Accommodation for contacts;

3. Fumigation by sulphur in pots.

Tientsin.

There exists at present at Taku a quarantine station to serve Tientsin, which forms the base from which the quarantine officers carry out their work. The equipment of the port is not sufficient even to enable medical inspection to be carried out efficiently and, in consequence, the whole system needs reorganising. The local administration should form a part of and be responsible to the Central Quarantine Organisation, which should provide the medical and other staff necessary.

The local administration should control:

(*a*) Medical staff for inspection of vessels with adequate launch facilities.

(*b*) Small bacteriological laboratory equipped to carry out routine diagnostic work. This presupposes a trained bacteriologist on the staff.

(*c*) Emergency accommodation for ten patients until transfer to a larger hospital can be carried out.

(*d*) Equipment for fumigation, when necessary, of empty vessels by means of sulphur. In the event of the arrival of an infected vessel having many passengers whom it was required to keep under observation, the vessel could be sent on to Newchwang (if practicable) or ordered to Shanghai (a distance of 740 miles).

Tsingtau.

Administration: The control of the quarantine administration should, at the proper time, be transferred to the National Quarantine Service. The essential equipment would comprise:

(*a*) An efficient medical inspection service with suitable launch facilities;
(*b*) A small bacteriological laboratory;

(*c*) Repair of quarantine station to provide for staff quarters, laboratory, hospital of ten beds and limited accommodation for close contacts upto one hundred beds;

(*d*) Necessary pots and sulphur for fumigation of vessels which cannot be fumigated at Shanghai.

Amoy and Swatow.

Administration: This should be transferred to the National Quarantine Service. The essential organisation would comprise:

(*a*) An efficient medical inspection service;

(*b*) A laboratory in connection with the service or, in the case of Amoy, the university;

(*c*) Arrangements to supervise health of emigrants either at a quarantine station or other premises;

(*d*) A fumigation service using sulphur dioxide.

Canton.

Administration: The officer administering the quarantine service should be directly responsible to the Central Administration of the National Quarantine Service. The organisation should provide for:

(*a*) A regular medical inspection service and supervision of the health of crews of vessels in port;

(*b*) Laboratory facilities to assist in diagnosis and to control measures of detention;

(*c*) Suitable provision in shore hospitals for isolation of infected persons and their immediate contacts;

(*d*) Suitable provision for treatment of cases of venereal disease among the crew of vessels in port;

(*e*) Fumigation by sulphur dioxide;

(*f*) Sanitary inspection of vessels;

(*g*) A permanent service for rat-catching and examination on the Water-front.

Antung.

Administration: The administration should be transferred to the Central Organisation of the National Service. The organisation should provide for:

(*a*) A regular medical inspection service;

(*b*) A quarantine establishment with laboratory, isolation hospital, disinfection plant and contact accommodation;

(*c*) Fumigation by sulphur dioxide.

Other Ports.

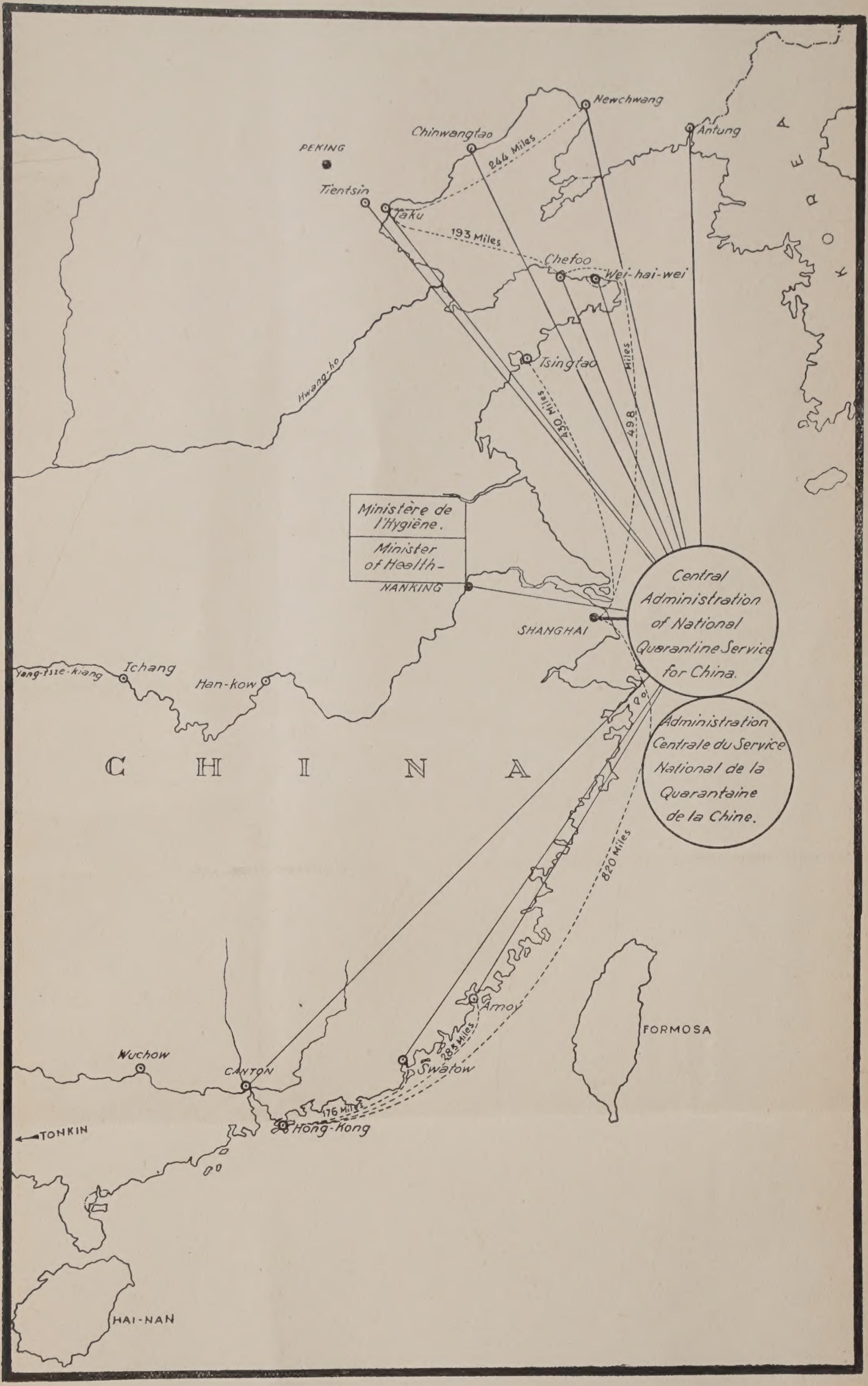
Other ports of call for foreign vessels should be provided with facilities for medical inspection.

These would include Chinwangtao, Wei-hei-wei, Chefoo.

In the case of Chefoo, there should be provision for the examination of emigrants prior to their departure.

The medical examinations may be provided through the agency of part-time medical officers, responsible to the Central Organisation.

SCHEME FOR NATIONAL QUARANTINE SERVICE FOR CHINA.


Newchwang
Antung
Chinwangtao
244 Miles
PEKING
Tientsin
Taku
193 Miles
Chefoo
Wei-hai-wei
KOREA
Tsingtao
Hwang-ho
430 Miles
498 Miles
Ministère de l'Hygiène.
Minister of Health–
NANKING
SHANGHAI
Central Administration of National Quarantine Service for China.
Administration Centrale du Service National de la Quarantaine de la Chine.
Yang-tsze-kiang
Ichang
Han-kow
CHINA
820 Miles
FORMOSA
Amoy
283 Miles
Swatow
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CANTON
176 Miles
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TONKIN
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